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Contractors and Engineers Monthly

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Highlights Of This Issue

Post-War Highways

The highway industry has before it great opportunities to make an outstanding contribution to prosperity and the post-war world. In four articles in this issue we have discussed the various phases of the post-war road program.

• See pages 2 and 4.

Construction for the Army

To speed up concreting at a Southwest Ordnance Depot, an unusual set-up for the concrete mixer made possible efficient pouring at varying heights; for speedy paving of runway and road base and surfacing at a Midwest Air Field, the contractor set up two complete asphalt plants which produced 3,055 tons of hot-mix in 18 hours; and form work and the monolithic pour of reservoir walls featured work to provide additional water-storage facilities at an Army Base.

• See pages 1, 2 and 18.

Highway Maintenance

Two aspects of road maintenance include roadside mowing and surface-treatment methods to keep bituminous highways in as good condition as possible for the duration. New Hampshire's bituminous surface-treatment methods are described in detail, including the changes made in procedure for 1943, while another article discusses highway mowing in Ohio.

• See pages 6 and 23.

New Wartime Routes

Some access road work and construction of vital highways continue. In this issue we describe the construction of a new Ohio access road, a new relief highway to connect vital military bases in Colorado, and a new grade separation to facilitate war traffic in Ohio.

• See pages 2, 9 and 11.

Fighting Constructors

The training of the Construction Battalions of the U. S. Navy, the Seabees, who, it is said, can build, repair, or destroy anything, is described and illustrated in an article and pictorial display resulting from a visit by the Editor to Seabee training centers.

• See pages 13, 32 and 33.

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Longer Equipment Life Semi-Monthly Inspections, Complete Overhaul Yearly

(Photo on page 64)



Entrance to the office of the Franklin County, Ohio, Highway Department.

♦ A REGULAR thorough checking of every car, truck, and unit of highway equipment means longer service, fewer breakdowns, and less lost time. Allan Slade, County Engineer, Franklin County, Ohio, believes in this and has proved the economy of regular equipment inspection at the repair garage on Dublin Road, on the outskirts of Columbus, the state capital.

The offices and repair garage are located in a single attractive field-stone building built in 1937-38 by WPA labor. The office section is 60 x 84 feet in plan, two stories high and with a full basement. The repair garage, extending west from the office building, is 160 x 60 feet and attached to it, forming an ell, is a 60 x 120-foot storage garage.

The Check-Up System

The check-up system used in the Franklin County repair garage is aimed to maintain every piece of equipment in service as long as possible without undue wear and to prevent the failure of any integral part of the machine. All of the motor trucks are given a thorough checking every two weeks, and once a year the motors on every piece of equipment and every part of each truck are given a complete overhaul.

At the east end of the repair garage is a large blackboard ruled off with white paint into columns for recording

Franklin County Maintains Central Repair Garage at Columbus, Ohio; Regular Checking Pays Dividends

the number of each county truck, the name of the driver, the date and mileage reading for the last oil change, and the same information for the last lubrication check. The oil in the crankcase is changed every 1,000 miles, or at least once a month, and the trucks are lubricated every 500 miles.

An Inspection Report blank, mimeographed on an 8½ x 14-inch sheet, aids the mechanic in the semi-monthly check-up of trucks and cars. At the top is space for the name of the driver, make of vehicle, its county number, license number, mileage recorded, motor number, model and capacity. Beneath this is a list of 36 items which the mechanic is required to check, and then record below the date that the car was inspected and lubricated, any remarks covering needed repairs or replacements, followed by his signature and title. The 36 items which are checked on this semi-monthly report are:

Road test for performance, squeaks and rattles.
Record oil-pump pressure. (Engine warm.)
Record generator reading.
Check horn.
Check windshield wiper for operation.
Check clutch pedal clearance—and pull back spring.
Check hand brake.
Check hood fasteners.
Set spark-plug gaps to specifications.
Set breaker points to specifications.
(Continued on page 28)

A Mixer on Stilts Pours Concrete Fast

Contractor for Warehouses At a Southwest Ordnance Depot Puts Mixer on High Frame on Truck

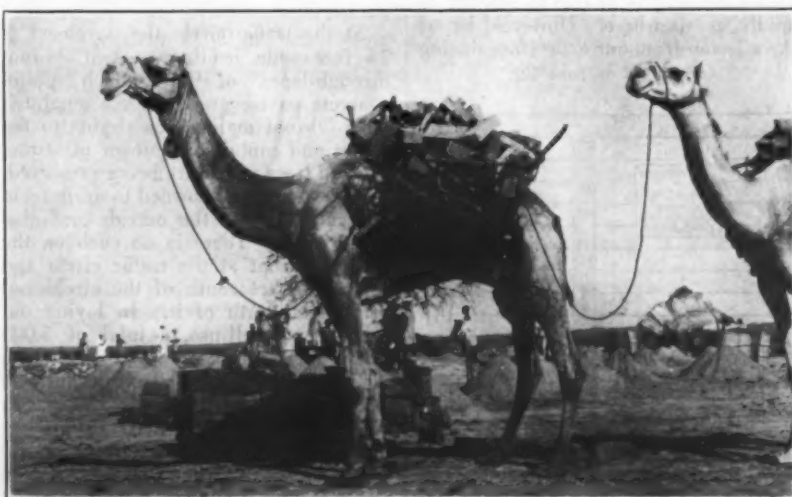
♦ IT looked as likely to tip over as a youngster learning to walk on stilts, but the elevated 14-S mixer perched 15 feet above the ground was well braced both for working in place and when moving. The contractor developed the first unit to pour footings on a housing project, but improved the machine greatly for pouring footings, stub walls and warehouse floors for a large Ordnance Depot in the southwest. A heavy-duty truck with dual rear pneumatic tires was stripped down to the bed and a pair of heavy I-beams bolted transversely to the frame, one just behind the cab and the other at the rear. To these, four 3½ x 3½ x ⅝-inch angles were welded as posts with 2¼ x 2¼ x ⅝-inch angles as diagonal braces in two sets front and back against lateral sway. To prevent forward sway a pair of angles was attached to the truck frame through the front mud guards and to the top of the tower, and another pair at a steeper angle at the rear to short extensions of the truck frame.

The Mixer Platform

The mixer, a 14-S Rex, was set on a platform of structural steel with a walkway around it for the operator and a pipe rail for safety. The legs of the mixer platform were the same as the posts welded to the truck frame and with holes every 6 inches so that the

(Concluded on page 12)

DESERT SHIPS WORK ON BASE FOR SHIPS OF THE AIR



Pan American Airways Photo

In constructing an airline across Africa, the old and new in transportation and construction equipment joined up for speedy completion of the job. See page 42.

POST-WAR ROAD PROGRAM

Effect of a Well-Balanced Nation-Wide Program of Highway Construction on The National Economy

By CHARLES M. UPHAM, Engineer-Director, and DANIEL R. LAMSON, Research Engineer, American Road Builders' Association

† EACH industry is seeking, through its research and planning committees, to determine where it fits into the post-war economy of this nation. Each is motivated first by the basic instinct of self preservation—can it survive the inevitable changes of the post-war world? When convinced that it will survive, its studies expand into the need for its products, the employment it will create, and its contribution to a basic national prosperity without which the whole fabric of interdependent industry will disintegrate.

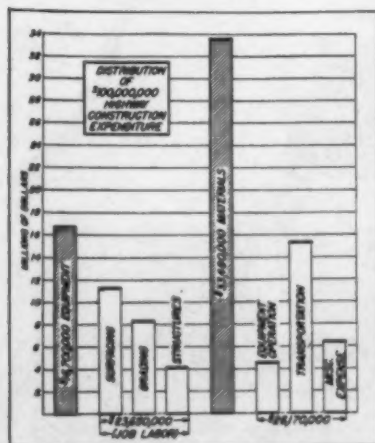
Since highways are the life-lines of transportation, starting with the most isolated farmhouse or trading post, and serving to unite all our natural resources with the other transportation systems—air, rail, and water—and thence to the processing plant and ultimate consumer, there is little likelihood that highways themselves, the highway industry, or the great highway-user industry will disappear in the post-war era. The problem for the highway industry, therefore, is not will it survive but how it will serve to contribute most effectively to the post-war national economy.

Absorption of Man-Power

In addition to providing needed facilities for the transportation of our natural resources and manufactured goods, highway construction offers exceptional opportunity for the absorption of man-power. This objective cannot be reached, however, unless there is available, at the time needed, a pool of projects complete as to designs, plans and specifications, cost estimates and right-of-way contracts. And the volume of work planned must be sufficient to absorb the great number of employables made available by the release of the men from the armed forces and the war industries. The program must be of sufficient size to last over a period of years, so that it can be used as a reservoir during the time that private industry shifts from its remarkable production for war to again producing durable and consumer goods for the people of this nation and the world.

The program must be sufficiently flexible so that it can be enlarged or reduced in any one year to meet varying conditions. This is easily possible by the very nature of the work. Projects may be large or small, they will be distributed over every state, and can be increased in volume in any state where private industry is unable to convert as rapidly as elsewhere. However, let us take a lesson from our experience during

(Continued on page 30)



Typical of the roads of peace is this divided highway and interchange.

What Should Be Done Now? Where Will Roads Be Built? What Kinds of Highways? How Will Work Be Financed?

† THE hiatus in highway construction resulting from the war is giving us a chance to take stock. While planning today is not easy, with the dearth of man-power and reduced highway funds, there is still opportunity to give serious consideration to securing from our post-war Federal-Aid highway construction, overall employment, rehabilitation of our present highway system, solution of urban traffic problems, and the elimination of crossings at grade of important highways and railroads.

H. S. Fairbank, Chief, Division of Research and Planning, Public Roads
(Continued on page 38)

Present Status of Plans For Post-War Construction On State Highway Systems; Federal Financing

† REPORTS are available from no less than 39 states and the District of Columbia throwing light on their approaches to post-war plans, the present status of design, acquisition of right-of-way, and some of the difficulties faced. We are reporting briefly the status of post-war planning in each state from which information is available. Financed by the \$10,000,000 special fund authorized in the Defense Highway Act in 1941, over 27 states are preparing detailed plans and specifications for roads and bridges estimated to cost over \$200,000,000. In the items below, engineering work financed by the Defense Highway Act of 1941 is referred to as DHA projects. This act requires the states to match the Federal contributions, so that plans for a highway building program which will ultimately cost nearly \$500,000,000 are being developed. According to Commissioner Thomas H. MacDonald, Public Roads Administration, this is equivalent to about two years of normal pre-war Federal-Aid highway construction.

Alabama has fifteen DHA projects approved in or near Anniston, Birmingham, Centerville, Dothan, Huntsville, Mobile, Montgomery, Oxford, Troy and Tuscaloosa, totaling \$6,194,000.

Arkansas reports that loss of highway revenues and engineering and technical personnel has made it necessary to re-

(Continued on page 14)



A well-developed roadside capable of economical maintenance.

The Skillful Development Of Roadside In Post-War Plans Will Result in Greater Harmony and Economy

By H. J. NEALE, Landscape Engineer, Virginia Department of Highways, and Chairman, Committee on Roadside Development, Highway Research Board

† ROADSIDE development is no newcomer to highway design. It is now recognized as an essential means of controlling the forces of nature and man which destroy the safety and attractiveness of the right-of-way outside the traveled way. The contribution which the Landscape Engineer, trained in highway requirements, can make to the preparation of the designs for our post-war highways is great.

Pre-war maintenance experience has shown that to have economical and

(Continued on page 54)

Speedy Wartime Paving

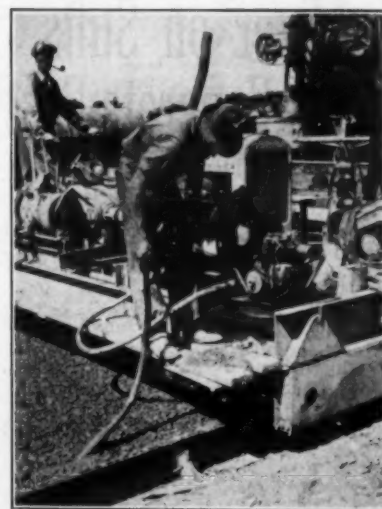
Dual-Drum Paver on Ohio Access Road Job North of Dayton, Ohio; Large Traffic Circle, Divided Roadways

(Photos on page 64)

† THE new 7.5-mile grading and concrete-paving contracts awarded by the Ohio Department of Highways in February, 1942, for projects SN-FA-581-B(2) and SN-FA-196-A(1) north from Dayton to Vandalia have numerous features of interest in design and construction. The new route takes off from the existing U. S. 25 at a large traffic "circle" which is really an ellipse 560 feet long and 425 feet wide with four centers. This permits transfer of vehicular traffic from one route to another with less confusion than a grade crossing, but not as easily as would be possible with an underpass with cloverleaf accompaniment.

At the traffic circle the pavement is 36 feet wide leading to two 24-foot through-lanes of 9-8-8-9-inch plain-concrete pavement. These are separated by a 30-foot mall which drains to the center and contains a number of attractive old trees which are being preserved. Each pavement is crowned to drain from its center line to the outside and also to the mall. There is no curb on the project except at the traffic circle and for 2,300 feet south of the circle and 3,700 feet north of it. In laying out this 4-center ellipse, a total of 5,000 stakes was required.

The new highway, itself a military access road to a new air base, is a limited-access road fenced to prevent entrance of vehicles except at a few local roads. Red-surfaced acceleration and deceleration lanes are provided at all entrance roads. These lanes run a minimum of 600 feet each side of the



C. & E. M. Photo
Safety speeds the job. This platform on the back of the finishing machine saves the vibrator man climbing over the machine when shifting from side to side.

intersections which, except for the through pavements, are also of red concrete and were laid with 2 inches of concrete mixed with red oxide as the surface, after the gray concrete was struck off as for the laying of reinforcing fabric.

Since no property has direct access to the highway, six service roads of 20-foot 9-6-6-9-inch concrete, with a combined length of 6,071 feet, provide egress for adjoining property in built-up subdivisions.

Major Quantities

The major quantities involved in this \$1,216,815.80 project, started the last week of February, 1942, and scheduled for completion in December, 1942, were as follows:

(Continued on page 36)

Dual Asphalt Plants Mix Runway and Road Base and Surface Materials for Big Midwest Air Field

† IN order to pave the shoulders of three 5,500-foot concrete runways and a considerable mileage of macadam-base streets, the asphalt paving contractor at a Midwest Air Base set up two separate hot-mix asphalt plants just outside the reservation. On one big day, while paving runway shoulders, the plants turned out 3,055 tons of paving material in 18 hours of plant operation. One of the plants was purchased direct from an asphalt plant manufacturer, while the other was designed and assembled by the contractor. Both are 5,000-pound batch outfits.

Aggregate and Asphalt

The coarse-gravel aggregate was trucked about 16 miles to the site and had the approximate proper gradation as received. Hauling was started at 5:30 in the morning and continued until 7 p.m., and was in excess of plant consumption during those hours. The excess was stockpiled and reloaded as required during the night by Barber-Greene loaders. Before asphalt-paving operations started, a stockpile of 40,000 tons of aggregate was stored against failure of the producer to deliver at any time during the operations.

The concrete sand used for the mixes was also hauled the same distance and either delivered over the same ramps to the grating at the rear of the plants or stockpiled for future use. Lake sand, a finer grade, was received by rail and unloaded to trucks by a clamshell bucket and crane.

Shell asphalt was shipped in insulated tank cars. The asphalt used on

(Continued on page 46)

Your post-war road or street program

A series of advertisements pointing out
how TEXACO Asphaltic products
can fit into your program

#2

**ROAD-MIX
SURFACING**
with
TEXACO



Highway surfacing by the Road-mix method, using Texaco Slow-curing Oil and Gravel . .
Small photo shows a typical low-cost Texaco surface of the Road-mix type in Colorado.

Here is the problem: How to build a road surface adequate to serve fairly heavy traffic for years, when your available equipment is limited and your budget small?

Road-mix surfacing with Texaco Asphaltic products is the answer.

One or more power graders, an asphalt distributor and possibly a roller are the only equipment required for this type of construction. Some times, all or part of the aggregate for a Texaco Road-mix surface is already on the street or road, or else it is available not far from the project. A

Texaco Cutback Asphalt, Slow-curing Oil or Emulsified Asphalt is applied to the aggregate in the proper proportion. Then, after thorough mixing by blade grader and compaction either by traffic or roller, a tough, resilient surface two to three inches thick is obtained.

Texaco street or road surfaces of the Road-mix type, because of their low cost and the limited equipment needed to construct them are within reach of every community. Hundreds of miles are now in the service of states, counties and municipalities throughout the country.



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Contractors and Engineers Monthly

THE NATIONAL BUSINESS PAPER FOR CIVIL ENGINEERING
CONTRACTORS AND HIGHWAY ENGINEERS AND COMMISSIONERS

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Highway Post-War Planning Must Be Based On Future Needs

"Whether we are to start our post-war planning now or put it off until the urgent necessities of war have lapsed into peace is no longer a question for argument. Most thinking people, and certainly most highway officials and engineers, agree with Paul G. Hoffman, President of the Studebaker Corp. and former Chairman of the Board of the Automotive Safety Foundation, who said in his acknowledgment of the receipt of the George S. Bartlett Award at the meeting of the American Association of State Highway Officials at St. Louis, Mo., "You can not wait until you have won the war to win the peace. Only by immediate planning of products and marketing can business be prepared to meet the problems and take advantage of the opportunities of the post-war period. Similarly, unless highway officials and engineers are ready with a comprehensive and orderly program for highway development when peace comes, the future of our highway system may be put in jeopardy by its becoming a political football!"

The question then is not "shall we plan?" but "what shall we plan?" for our highways. How shall we get started? Here we meet some divergence of opinion about the type of highways and highway work to plan and prepare for the immediate post-war period. Speaking on "The Effects of War on the State Highway Departments and Their Programs" at the same AAHSO meeting, M. J. Hoffmann, Commissioner of Highways of Minnesota, made the statement that the present deferred maintenance of our existing highways will require such a tremendous program of rehabilitation after the war that we should attend to that first and direct our immediate post-war planning programs principally to that end, rather than concentrate too heavily on plans for super-highways which post-war conditions may or may not show to be necessary. On the other hand, highway officials in other states are already at work on plans for extensive super-highways which they believe to be sorely needed, so that at the moment critical materials and manpower are available, active construction on the "roads of tomorrow" can start.

In this issue we discuss the vital place of highways in our national economy and the types of highways needed in the future. But the problems and needs vary in each individual state or county. The recommendations for a highly industrialized area certainly will not hold in an agricultural region, no matter how appealing is the vision of broad sweeping super-highways flowing across the landscape. Accordingly, Commissioner Hoffmann has emphasized an extremely important point in our planning for the post-war period in bringing up the ques-

tion of post-war conditions.

As an illustration, many engineers and economists believe that the post-war world will depend increasingly on the transportation of men and goods by airplane because of the tremendous strides of that industry during the war. They see highways becoming a secondary factor in our transportation system. This introduces an important aspect in post-war planning which must be considered now before any practical preparation of plans for post-war highway work can be done.

Industries as well as nations must drop isolationism in looking ahead to the future. Highways and aviation, for example, need not enter the post-war world as rivals, but as complementary services to the public. If the leaders of these two industries get together now and discuss their plans, projects and common problems, in a spirit of cooperation rather than rivalry, each industry can be made to provide better service for the public, each will have its important place in the economy of this country and the world, and the plans each make now will be more closely related to the actualities of the post-war world.

No people can stand still: they either progress or retrogress. We shall go forward in war to win a peace and a better world, but that world must be planned and its component parts integrated. We must use the best minds of this generation which can be spared from active participation in the war to plan for the business, economic and social aspects of life in the future.

Subsequent articles in our series on post-war planning will discuss aviation, airports and Flight Strips; housing; flood control and irrigation; public utility expansion; and other aspects of construction for the future needs of this country. Highway officials will best serve the public if they consider the future prospects and needs, not only of the highway system under their jurisdiction, but of all phases of future development—industrial, agricultural, and recreational—within their states or counties, before blueprinting their highway plans. Only thus can present highway planning meet the practical needs of the future.

Steel-Bridge Awards Discontinued for War

The American Institute of Steel Construction, which has made annual awards from 1928 to 1942 for the most beautiful large, medium-size, small, and movable bridges constructed during the previous year, has announced that its awards will be discontinued for the duration, owing to conditions brought about by the war.

As some bridges have been, and will

be, built since 1941, the period covered by the last competition held, and the end of the war, it is the intention of the Institute to reinstate these awards, and the structures then eligible to compete will include all those steel bridges constructed since the beginning of 1942 and the time of reinstatement of the competition.

Simplification Order On Asphalt Machines

Bituminous machinery which is now used chiefly for strategic highways and airports in mixing, applying and finishing tar, asphalt, bituminous emulsions and road oils is now subject to an overall 85 per cent reduction in the number of models, according to Schedules IX, X, XI, XII, XIII, XIV, XV under Simplification Order L-217. The specific items covered include tank-car heaters, boosters and circulators, bituminous paving finishers, bituminous distributors and distributor pumps, bituminous heating kettles, bituminous-materials maintenance units, bituminous patch plants, and asphalt surface heaters. In each of the seven schedules, repair parts are exempted from the restrictions imposed. Each schedule also limits production to those currently manufacturing the specific items.

Tank-car heaters are limited to one model in the two-car size of 26 to 36 boiler-hp at not less than 125-psi working pressure and mounted on a 2-wheel trailer. The other is the 3-car size of 40 to 55 boiler-hp, operating at not less than 125 psi and also mounted on a 2-wheel trailer. Manufacturers are limited to one model of a pumping booster or circulator capable of raising the temperature of a 10,000-gallon tank 50 degrees per hour when pumping, and unloading at 175 gallons per minute. This unit may be 2 or 4-wheel trailer-mounted or truck or skid-mounted.

Bituminous paving finishers are limited to one model of 10-foot width with cut-off and extension attachments. This reduces these machines from six models to one.

Bituminous distributors are limited to one model of 800-gallon capacity and one of 1,250-gallon capacity, either trailer or truck-mounted. Distributor pumps are reduced to one type with a rated capacity of not less than 375 gallons per minute and with not less than 4-inch intake, and 3-inch discharge openings.

Heating kettles are limited to one model in each of four sizes, 30, 80, 110 and 165-gallons capacity, which must not be mounted on rubber tires, nor have more than one draw-off cock, use no mercury-type thermometers or power-spray attachments, no barrel warming hoods or barrel hoist and have not more than one burner shut-off valve. Mud guards are also ruled out. Thirty models and sizes now made are reduced to four by this order.

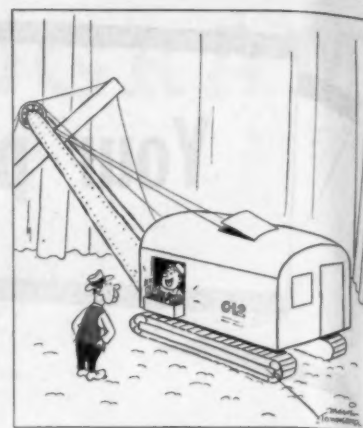
Bituminous maintenance units are reduced from eight models and sizes to three, one each of 120, 300 and 600-gallon capacity, all 2-wheel mounted. Pumps for these units are limited to one pump of a rated capacity of not more than 100 gallons per minute.

Bituminous patching plants, now made in ten models and sizes, are reduced to one model of 10 tons per hour capacity, and one model producing between 15 and 30 tons per hour.

Asphalt surface heaters, now made in six models, are reduced to one model 4 x 6 feet to heat an area of 24 square feet at one time.

California Curtails Roadside Development

Roadside development which was previously carried on by the California Division of Highways maintenance forces has been curtailed during the past season, according to the Thirteenth Biennial



"It's my Victory garden!"

Report of the Division to the Governor of California. Replacement of trees and shrubs which die out or are injured has been discontinued and watering has been reduced 50 per cent. This is considered the minimum amount of care to keep the plants alive.

Tree maintenance crews have been reduced in personnel from 75 men to 52, the minimum number with which to carry on the work and attempt to preserve nearly normal conditions, and no new plantings are being made with maintenance funds.

Roadside fire hazard control costs have increased and this program is also being materially curtailed, the report states.

Campaigning for Maine's Anti-Diversion Amendment

Sponsored by a number of organizations in the state of Maine, the proposed constitutional amendment to protect Maine's highway funds is being brought to the attention of the voters by a well-planned publicity and educational campaign. As a part of this campaign the Maine Good Roads Association has issued a supplement to its publication, *The Trail*, devoted to the amendment and distributed with it a pamphlet, issued by the organizations sponsoring the legislation, which outlines in simple interesting form the reasons for such action.

This material is presented in question and answer form, and covers the interests of all groups of Maine voters—farmers, labor, businesses—as well as outlining the general reasons for such legislation, including its importance to Maine's highways both during and after the war. It ends with suggestions for informing one's representatives of one's wishes, pointing out that elected representatives want to do what their constituents wish, but can't do so unless they know their wishes.

The organizations supporting this amendment to protect highway revenues in Maine include: Commercial Motor Vehicle Assn. of Maine, Maine Automobile Assn., Maine Commercial Travelers Assn., Maine Dairymen's Assn., Maine Farm Bureau Federation, Maine Federation of Agricultural Assns., Maine Good Roads Assn., Maine Hotel Assn., Maine Lumber Dealers Assn., Maine Municipal Assn., Maine Petroleum Industries Comm., Maine State Retail Grocers Assn., Maine Rural Letter Carriers Assn., Maine State Federation of Labor, Maine State Grange, State of Maine Camp Owners Assn., and United Commercial Travelers of America.



C. & E. M. Editor Takes Government Appointment

Theodore Reed Kendall, Editor of CONTRACTORS AND ENGINEERS MONTHLY, has accepted an appointment as Consultant on Construction for the Division of Health and Sanitation, Office of Inter-American Affairs. The work of this Division involves the construction of hospitals and dispensaries, drainage for malaria control, water supplies, and sewage-treatment plants in Central and South American countries.

Mr. Kendall is serving without com-

pensation on a part-time basis, and his duties will in no way interfere with his editorial work.

New Spreader Bulletin

The features of the Buckeye sand and gravel spreader are described and illustrated in a new bulletin recently issued by the Buckeye Traction Ditcher Co., Spreader Div., Findlay, Ohio. This unit, which is available in spreader-box lengths of 9, 10, 11 or 12 feet (or 13 feet on special order), makes possible a uniform and accurate spread of any

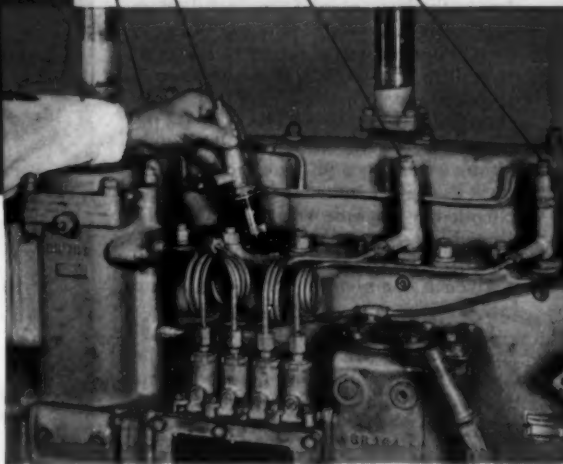
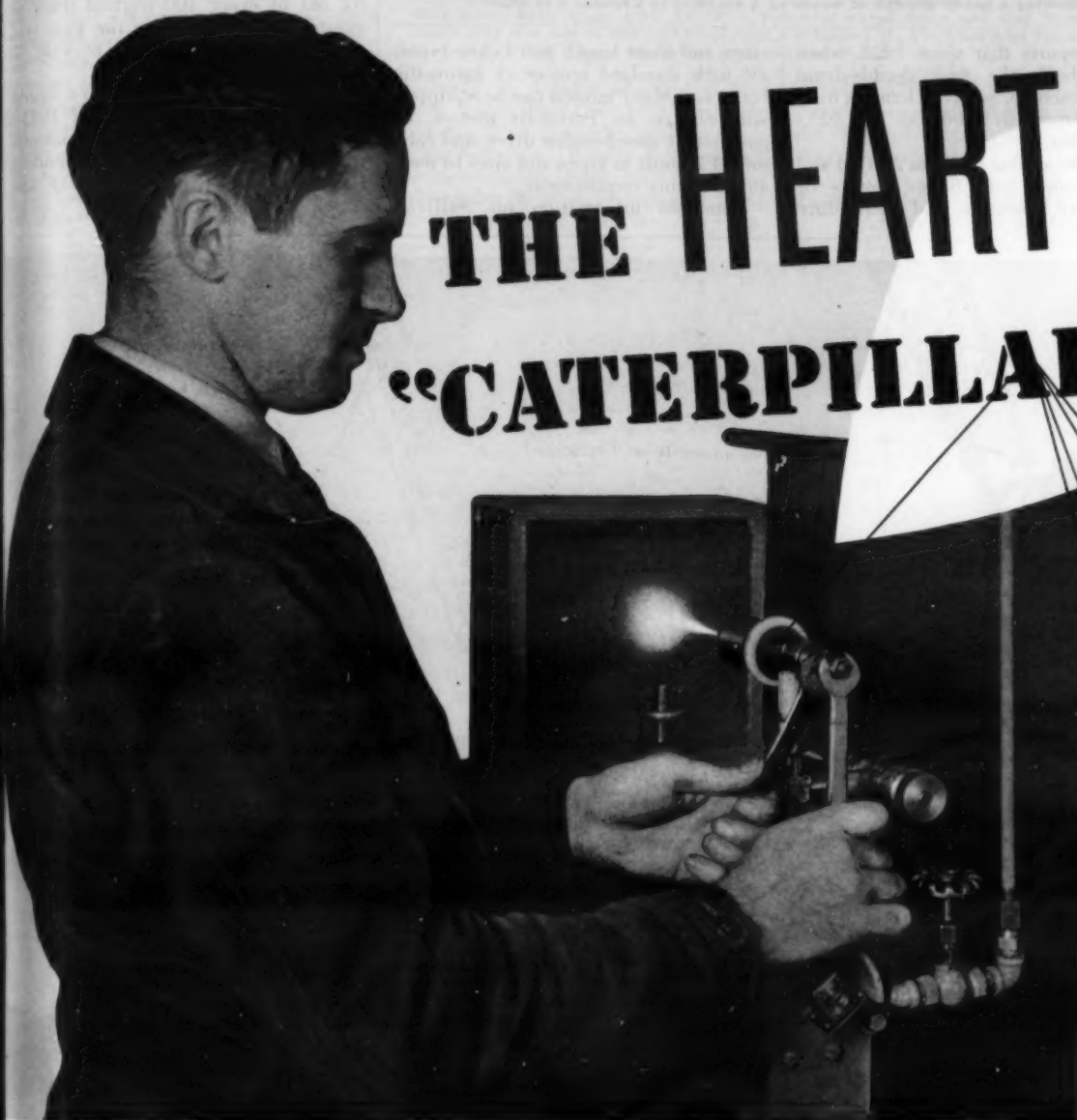
material from a fine sprinkle of sand to a 1½-inch layer of stone, regardless of truck speed, the bulletin states, and it operates equally well forward or reverse. It handles wet, sticky or dry material, and the spread can be tapered, thick on one edge and thin on the other, as desired.

Copies of this Bulletin SP-200 containing full information on the Buckeye spreader may be secured by interested contractors and state and county highway departments direct from the manufacturer. Just mention CONTRACTORS AND ENGINEERS MONTHLY.

Scrap and Rubber Salvage

Buick dealers salvaged 1,000 tons of scrap metal and rubber during February and turned it in to the nation's stockpile, according to W. F. Hufstader, General Sales Manager, Buick Motor Division, General Motors Corp. In response to an appeal for more copper and brass, salvage of non-ferrous metals increased to 80 tons during the month, it was also reported. A total of 12,000 tons of scrap metal and rubber has been salvaged by Buick dealers in the continuing campaign for scrap for the war.

THE HEART OF YOUR "CATERPILLAR" DIESEL



WHAT makes your "Caterpillar" Diesel Engine "tick"? What is it that gives this famous Diesel such outstanding power, flexibility, dependability and economy? Primarily it's the fuel injection system—vital heart of the engine.

The "Caterpillar" fuel system is in many ways unique. It is simple and durable, yet made with greater precision than a fine watch. It is built to give long, satisfactory service without operating adjustment. But when fuel injection valves become worn, engine performance falls off.

Consulting your Operator's Instruction Book and following its directions will pay dividends by insuring the long life of your fuel injection equipment. Here are some reminders:

1. Buy clean fuel and keep it clean.

2. Watch the fuel filter. Its job is to keep all foreign matter out of the fuel. As soon as the pressure gauge indicates that the filter is clogged and the flow of fuel restricted, the filter should be replaced.

3. If you believe the fuel injection system is in need of any kind of attention, take it to your "Caterpillar" dealer for testing. He has special equipment that shows quickly whether anything is wrong.

In times like the present, when all the nation's horsepower is working longer and harder in the victory effort, you can rely on your "Caterpillar" dealer for expert help. He

has dedicated his excellent repair facilities and mechanical skill to the task of keeping your equipment on the job, without waste of time or materials, until the final battle is won.

CATERPILLAR DIESEL

CATERPILLAR TRACTOR CO. • PEORIA, ILLINOIS

TO WIN THE WAR: WORK—FIGHT—BUY WAR SAVINGS BONDS!

Maintenance Mowing On Highways in Ohio

Grass and Weed Cutting Become
Essential Part of Road Maintenance,
Contributing to Safety and Economy

By R. C. BOWMAN, Maintenance Engineer,
Division 7, Ohio Department of
Highways

† WE can all remember when, a number of years ago, mowing was looked upon by maintenance crews as an extra costly operation which had to be performed in the summer time at the whim of a few disgruntled farmers. Experience has changed this point of view and today it is the consensus of opinion that a good mowing program is as essential as any other planned maintenance program.

Grass and weed cutting is done for the purpose of improving vision, for improving the appearance of the roadside, to control noxious weeds as required by law, as an aid to drainage and drainage structures, and to control erosion.

With these aims in mind, the following general schedule has been worked out to govern this operation in Division 7 of the Ohio Department of Highways. The schedule is based on the time the predominant grasses go to seed, and provides for a continuity of operations in the various counties within the Division. The most extensive cutting usually takes place from July to September 15. In general, the first mowing is delayed until the grass is approximately 8 inches high, and thereafter the grass should not be permitted to exceed a height of 6 inches. The schedule provides that all weeds be cut to the back edge of the ditch bottom or toe of fill slopes, around guard rails, sign posts, etc., before Memorial Day.

On all primary roads, one round is made with a mower on the shoulder and all weeds cut to the back edge of the ditch bottom or toe of fill slopes, around guard rails, sign posts, railway crossings and intersections before July 4. The complete schedule is then started, calling for complete mowing of shoulders to the back edge of the ditch bottom or toe of fill slopes, cutting noxious weeds on all slopes, with strict attention to additional mowing at road intersections, railway crossings and such other points as need clear vision. If the noxious weeds are thick enough to constitute a nuisance in areas other than those described, mowing operations are extended to include such growth. This program is routine until about September 15. Then the entire right-of-way is given a complete mowing to prepare for winter.

In Division 7 burning of weeds and grass is never practised, because of the destruction of mulch and dangers to the traveling public and adjacent farm property. Grass and weed cuttings are gathered and used as a mulch on barren areas along the roadside.

The ultimate aim of this program is to obtain a good stand of grass along all highways, thus sharply reducing the maintenance cost, improving the appearance of the roadside, and proving that mowing is a definite contribution to good maintenance.

From a paper presented before the Third Annual Short Course on Roadside Development, at Ohio State University, February, 1943.

New Catalog Issued On Scraper Haulers

A new two-color catalog describing the complete line of Sullivan scraper haulers has recently been issued by Sullivan Machinery Co., Michigan City, Ind. These haulers are designed for moving a large tonnage of ore and rock in mining and tunneling operations. The manu-



Mowing a heavy growth of weeds on a roadside in Division 7 in Ohio.

facturer reports that since 1922, when Sullivan built the first double-drum scraping machine, Sullivan haulers have scraped from 875,000,000 to 925,000,000 tons.

The Sullivan line includes 2-drum and 3-drum models with flange motors or foot motors, portable and heavy-duty

sizes, and short length and Lobite types, all with standard remote or automatic controls. Many models can be equipped with electric or Turbinair motors, or gasoline or diesel-engine drive, and each model is built in types and sizes to meet any scraping requirement.

Complete information on Sullivan

scraper haulers will be found in Bulletin 76-Y which may be secured direct from the manufacturer.

Backlog of Truck Sales Is Piling Up, Mack Reports

During the past 15 months, a total of 630,000 potential civilian truck sales have accumulated for peacetime business, according to F. F. Staniford, Sales Manager of Mack Trucks, Inc. Basing his figures on an average of 44,500 truck sales per month during the years 1937 to 1941 inclusive, Mr. Staniford subtracted the civilian truck sales made during 1942 to arrive at his total. Roughly, six out of every 100 normal truck requests have been met in the past year, and this ratio is expected to hold for the duration of the war.

According to Mr. Staniford's figures, this means that at the end of 1943 a backlog of well over 1,000,000 potential truck sales will have accumulated. Every additional month of war adds 42,000 to this figure.



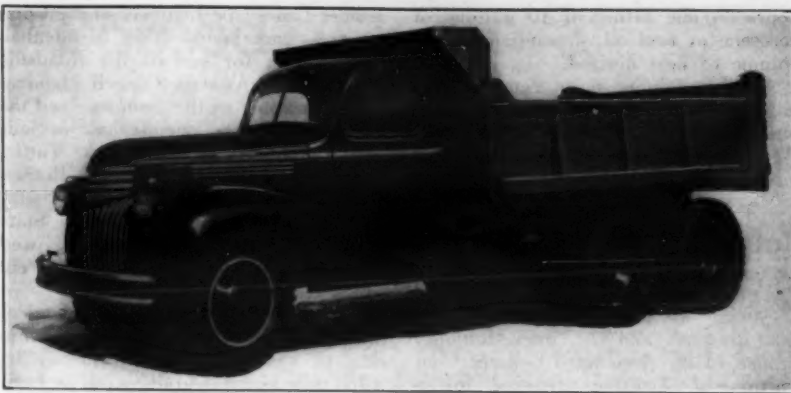
TEXACO

TUNE IN FRED ALLEN EVERY SUNDAY NIGHT—C

Rush Conversion Job On 400 Dump Trucks

A rush order from a Navy contractor for 400 Chevrolet trucks to be converted to heavy-duty units with Thornton four-rear-wheel drive and equipped with 5-yard Gar Wood dump bodies, was recently completed by the Thornton Tandum Co., Detroit, Mich. The delivery of this order is interesting not only from the standpoint of the adaptability of standard trucks, but also because it illustrates the new fields open to automotive dealers. Even though normal peacetime channels of business are closed, the delivery of these trucks represented to the dealer who secured this business the fulfillment of a \$1,500,000 order. With heavy-duty truck production drastically curtailed for the duration, the practice of making "big ones out of little ones" has opened an opportunity for dealers handling trucks of 1½ to 3-ton capacity, both new and used.

The basic unit was the 1½-ton standard Chevrolet truck chassis designed



This heavy-duty truck with Thornton four-rear-wheel drive and Gar Wood 5-yard dump body was one of 400 converted from a standard 1½-ton Chevrolet for a contractor doing work for the U. S. Navy.

originally to handle about a 2-yard dump body. The Thornton conversion consists of a complete walking-beam spring suspension, frame reinforcements, increased chassis length, and two driving axles under the load, by means of which the capacity of the truck was more than

doubled. It readily handles the 5-yard dump body in the strenuous service of the contractor doing work for the U. S. Navy, it is reported.

Be a "scrapper". Make war on waste. If you can't use it, scrap it!

Specialist Recruits Needed by Engineers

Army Engineers Call for Construction Specialists for Service with Engineer Troops: You Can Enlist Now

† THE Corps of Engineers, U. S. Army, has announced a special recruiting drive for the enlistment of technicians and construction specialists for service with the engineer troops. Under this plan of enlisting 9,000 specialists a month, trained equipment operators and technicians who have been working as civilians on engineering and construction projects may, prior to their induction by Selective Service, volunteer for enlistment with the Engineers. There are no age restrictions under this new enlistment program, all men over the age of 18 who qualify in any one of the seventy-five listed technical occupations being acceptable as enlisted specialists.

The plan is designed to appeal to trained civilians who, as the Army's emergency construction program tapers off, are becoming subject to the draft and to those who are anxious to put their training and skills in service for the war effort. Application may be made at any Army Engineer office, where the applications are reviewed and the qualifications passed on. If acceptable, the applicant will be given a letter to his Induction Station which will earmark him for duty with the Corps of Engineers. From the Induction Station, the men are sent direct to Engineer training centers at Fort Belvoir, Va.; Fort Leonard Wood, Mo.; Jefferson Barracks, Mo.; or Camp Claiborne, La. Such technicians can advance in grade as rapidly as their special training justifies. They will have the same opportunity to secure commissions through the Engineer Officer Candidate School as other enlisted men, but their previous training should allow them to speed up the normal process.

In announcing this program, Major General Eugene Reybold, Chief of Engineers, said, "The mission of the Army's Corps of Engineers is developing with the progress of our attack. We are finishing up the biggest emergency construction program the United States has ever seen. Now we're moving on to a program of construction overseas. We're in the middle of a big job now—the job of helping to move men and equipment into place for assault. We need men for this present job, as well as men for the next job coming up—the attack itself.

"This is a challenge to men who want to help engineer the forthcoming American Victory—who want to get this war over with in a hurry. We'll give these volunteer specialists as much training as a good man can take. We've a date with a certain paper-hanger; and an Engineer keeps his appointments."

Men in the construction field who are interested in volunteering for this important branch of the U. S. Army should apply to their nearest Army Engineer office. If you don't know where the Army Engineer office nearest you is located, write to this magazine and we shall be glad to send you its address.

Buckeye Promotes Cochran

The Buckeye Traction Ditcher Co., Findlay, Ohio, has announced the appointment of Paul B. Cochran, Sales Manager of Buckeye for the past several years, as General Manager of the company, and also his election to the Board of Directors.

Buckeye is at present producing power shovels, trenchers, gravel spreaders, tractor equipment, and R-B power Fine-graders, as well as war material.

PROTECT YOUR CABLES for Vital War Work

SETTING in place this 40-ton destroyer deckhouse and other huge prefabricated ship sections represents one of the important wartime uses of wire rope.

To keep cranes, shovels, hoists, draglines, derricks in service... doing vital war work... operators everywhere are protecting their wire rope by lubricating it with *Texaco Crater*.

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A Texaco Lubrication Engineer will gladly cooperate in the selection of the most suitable lubricants for your equipment. Just phone the nearest of more than 2300 Texaco distributing points in the 48 States, or write:

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Lubricants and Fuels

FOR ALL CONTRACTORS' EQUIPMENT

HELP WIN THE WAR BY RETURNING EMPTY DRUMS PROMPTLY



A Scheu salamander running at a high rate to produce a large volume of heat at a sewage-treatment plant built in cold weather.

Compact Salamanders Give Safe Clean Heat

Among the features of the Hy-Lo oil-burning salamander made by the Scheu Products Co., Ltd., Upland, Calif., are its safety and cleanliness. As the fuel in the Hy-Lo salamander is not confined in a sealed container and is not under pressure at any time, there is no danger of an explosion, and another safety feature is the removable stack which, if accidentally hit, can be knocked off without tipping over the salamander. The Hy-Lo operates on kerosene or fuel oil and the firing speed is under complete control at all times, to be increased, decreased or extinguished at will. Another feature is that, when operating on good-grade kerosene, the Hy-Lo salamander is smokeless, and there are no ashes, dust or cumbersome fuel to handle, the manufacturer states.

The Hy-Lo consists of a round bowl, drawn from 24-gage iron and galvanized by the hot-dip process, in which is the wire-bound mineral-wool wick extending from the draft door opening downward in the down-draft tube. The stack base and bowl cover are close-fitting and easy to assemble. Above the stack base is the louvre section where flame and heat are concentrated and from which the heat is radiated. The fuel burns with a blue hot purring flame as in a blowtorch or pressure salamander. The stack is of heavy galvanized sheet steel built for years of hard usage, and will take standard stovepipe if desired on interior construction jobs. A hinged snuffer cap on top of the stack is left open while the Hy-Lo is in operation. The Hy-Lo will burn 10 to 20

hours on one filling of 10 gallons of kerosene or fuel oil, depending on the volume of heat desired.

A folder giving more complete details on the Hy-Lo salamanders, including directions for assembling and firing, may be secured by those interested direct from the manufacturer.

Roadside Award Made At Meeting in Utah

Officials of the State Road Commission of Utah and the Inter-Mountain Branch of the Associated General Contractors of America arranged for a special meeting in the State Capitol as the occasion for the presentation to G. W. Mendenhall & Sons Construction Co., Springville, Utah, of the Western Section Award of CONTRACTORS AND ENGINEERS MONTHLY'S 1941-42 Roadside Development Awards. The presentation was made by W. L. Anderson, Chief Design Engineer of the State Road Commission of Utah, who with W. H. Earnshaw,

former Landscape Engineer of the Commission, nominated the Mendenhall organization for one of the Roadside Development Awards. Cornell Mendenhall, a member of the firm, received the Award for G. W. Mendenhall & Sons Construction Co., and Mark Tuttle, Manager of the Inter-Mountain Branch of the A.G.C., also spoke. About fifty people, including members of the State Road Commission, contractors, and affiliated members of the A.G.C., were present.

The Award was made to the Mendenhall firm for an outstanding contribution to roadside development on its 3.784-mile highway grading job on U. S. 91 in Utah. A feature of the work was the excellent topsoiling which resulted from the use of a special blade device for spreading the topsoil developed by W. D. Mendenhall, one of the partners of this well-known contracting organization. A complete description of this device and the work it did appeared in an article on page 17 of the April issue, CONTRACTORS AND ENGINEERS MONTHLY.

New Bulletin Discusses Granular Stabilized Roads

The subject of granular stabilized roads is discussed in Bulletin No. 5 of the series of bulletins on wartime road problems being issued by the Highway Research Board. Although this report is of immediate emergency importance, the recommendations contained therein are general and need not be restricted to wartime practice.

The bulletin covers the structure of granular stabilized roads, the materials used in them, recommended practice for materials and mixtures, combining materials, revamping surface courses to form base courses, treatment with stabilizing agents, methods of construction, and the maintenance of granular stabilized surfaces.

Copies of this Bulletin No. 5, Granular Stabilized Surfaces, may be secured by state, county and town highway engineers direct from the Highway Research Board, 2101 Constitution Ave., Washington, D.C.



Watch Haul Roads... Keep Dust Down... Assure Fast Getaways for Shorter Cycle Time... to Increase Your Yardage Per Hour

Tournapulls are designed for high-speed earthmoving. The quicker your Tournapulls get into high gear and stay there, the higher your hourly production will be. For example, a Super C Tournapull at top speed in low gear travels 230 feet per minute; in high gear this same unit will go 1275 feet per minute.

Good Roads Add to Speed

Ruts or soft spots in your haul roads call for reduced speeds or gear shifts which increase cycle time. Then, too, the continual bumping over ruts means more equipment maintenance... maybe lay-ups for repairs. So watch your haul roads. Keep them smooth by re-

moving ruts with a motor grader or with Carryalls on return trips. Fill in soft spots with good dirt. Underfoot conditions on a usable poor road and a good one may easily make a difference in hauling speed of more than 100% with the same load and horsepower. Figure what that would mean in yardage per hour on your job.

Avoid Dust

In fleet operation of high speed Tournapulls, dust reduces visibility and speed... endangers both men and machines. If your operation is large, keep dust down by occasional light oil applications or, in the case of exceptionally heavy hauling over a single route, even stabilization will pay off in increased speed and yardage. In many cases, stabilization can be done by spreading a

thin layer of clay over the haul road, compacting it through normal travel of Tournapulls over the roadway and with blading. If neither oiling nor stabilization is feasible, use a water wagon.

Plan for Fast Getaway

Tournapull 2-wheel design puts weight on the drive wheels to give surplus rimpull for quick acceleration to top speed. Take full advantage of this quick acceleration by proper job layout and maintenance. Start your hauls downhill, if possible. Smooth out any ruts or soft spots at the edge of the cut or fill that might delay acceleration. This enables Tournapulls to reach top speed quicker, thus cuts several seconds off each round trip.

What About Tournapull Deliveries?

We'll be honest with you. We've got plenty of Tournapull orders on our books. However, a few Tournapulls are available for release through WPB. Remember, Tournapulls (1) conserve manpower, (2) save steel, (3) speed construction, (4) lower your costs. Ask your LeTourneau-"Caterpillar" distributor NOW for details on Tournapull deliveries and performance.



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Equipment Is Pooled To Finish Grade Job

A 7-Mile Grading Project On New Denver-Colorado Springs Route Delayed Till Units Released at Airport

(Photo on page 64)

It requires plenty of dirt-moving equipment these days to handle any big grading job, whether it be at an airport, an air base, or on a highway. Breathless haste is the watchword of every contractor. Haste has been necessary in the construction of air bases, air depots, and arsenals because "Time is short," and many highways need to be rushed to completion in the shortest possible time. In the case of a 7-mile contract on Colorado Highway 83, designed as a relief highway for the congested joint route U. S. 85 and 87, to by-pass all towns and eliminate an excess of curves and steep grades in the existing alignment of the new route, there was need for speed to permit the connection of the various bases within the state by a highway free from congestion.

The contract for the grading was awarded to DeRemer & Atchison of Denver on the bid of \$343,000. While this contractor normally has sufficient equipment to speed such a job as this, the demands of war work retarded early progress. Other organizations came to the rescue by lending miscellaneous grading equipment between Army airfield grading jobs. It is cooperation like this that is speeding many of our necessary projects to earlier completion than engineers anticipated.

The major quantities on this 7-mile grading job which was brought to completion on time, and a little better, after some early delays included:

Unclassified excavation	496,000 cu. yds.
Unclassified ditch excavation	6,600 cu. yds.
Dry rock excavation	600 cu. yds.
Dry common excavation, structures	2,300 cu. yds.
Wet rock excavation	300 cu. yds.
Wet common excavation	900 cu. yds.
Mechanical tamping	530 hours
Rolling fills	4,720 hours
Furnishing roller	8 units
Wetting fills	5,750 M gals.
Sheet backfill material	900 cu. yds.
Station-yard overhaul (500 feet free haul)	1,648,000 sta. yds.
Two-mile overhaul	48,500 yd.-mi.
Gravel and crushed-rock surface	65,600 ton-miles
Unrated bridge timber	4.6 MBF
Rated bridge timber	115.5 MBF
Asphalt-plank wearing surface for bridges	7,053 sq. ft.
Class A concrete	545 cu. yds.
Class B concrete	52 cu. yds.
Reinforcing steel	47,600 lbs.
Common rubble masonry	15 cu. yds.
Corrugated metal culvert pipe, 18-inch	250 ft.
" " " " 24-inch	1,506 ft.
" " " " 30-inch	194 ft.
" " " " 36-inch	926 ft.
Corrugated metal culvert	208 ft.
12-gage pipe, 48-inch	166 ft.
8-gage pipe, 48-inch	674 ft.
Corrugated metal culvert pipe, 84-inch	192.5 ft.
Multi-Plate culvert pipe, 90-inch	6,013 ft.
Treated timber piling	1,335 cu. yds.
Riprap	511 ft.
Perf. corrugated-metal pipe underdrain, 8-inch	66,400 ft.
Baled wire fence on metal posts	1,500 ft.
Picket snow fences	

Hitting the Cuts

DeRemer & Atchison regularly moved about 6,000 cubic yards of earth and soft rock a day on this job with its fleet of four 18-yard and one 12-yard LeTourneau Carryall scrapers, three 8-yard LaPlant-Choate Carrimor scrapers

and a $\frac{3}{4}$ -yard Northwest shovel on structure excavation. The Carryalls were pulled by D8 tractors, and two more D8 tractors were used as pushers for loading. A pair of McCoy tamping rollers on the fills were also pulled by D8's. For finishing the slopes on the earth cuts, the contractor used a Caterpillar No. 12 motor grader very effectively.

The additional equipment sent in by other contractors included nine RD and D8 tractors, two D7 tractors, twelve rollers, No. 11 and No. 12 maintainers, three Carrimor scrapers, four 18-yard and three 12-yard LeTourneau scrapers, a $\frac{3}{4}$ -yard Northwest and a $1\frac{1}{2}$ -yard Northwest shovel, three 1,000-gallon and one 1,500-gallon water tanks, two 420-foot compressors, Wooldridge and



C. E. M. Photo

Building fill on the new relief highway, U. S. 85 and 87, around Colorado Springs, in Colorado.

LeTourneau rippers, a 10-S concrete mixer, two water pumps, trucks, and other small equipment units.

A 90-Inch Culvert

A 192.5-foot Armco Multi-Plate culvert under a 60-foot fill was required to take care of the flow in one of the

mountain streams which crossed the new roadway. It was built with concrete headwalls and aprons to prevent undercutting of the structure after it was in service and subjected to the heavy flows from melting snows in the mountains to the west. The culvert was installed very

(Concluded on page 56)



... And How!

KEEPING 'EM on the job and in top-rate operating condition—that's the purpose of this new 24-page handbook for Lorain owners and operators. It tells you how to renovate worn parts so they can be re-used efficiently; how to substitute for critical materials when making emergency repairs; how to do more with what you've got.

Hundreds of operators have found that the Fix-It Handbook can save them time, trouble and money. If you haven't received a copy, clip and mail the coupon below.



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The Link-Belt Speeder Zephyrcrane.

Wheel-Mounted Crane Is Speedy and Agile

When the war is over, there will be many announcements of new pieces of equipment developed to meet wartime needs which will have equally useful applications in a world at peace. Occasionally even now, announcement is made of such a piece of equipment, one of which is the Link-Belt Speeder Zephyrcrane. This machine, which originated on the West Coast, was developed for one specific service, that of a fast easily maneuvered simply-operated unit capable of traveling quickly from station to station or job to job, for shipyard use. These same characteristics, however, will make it equally suitable for many tasks in the construction field in the future.

The Zephyrcrane is powered by a single-engine; is one-man-operated from a single cab; wheel-mounted on rubber for travel speeds up to 17.5 mph in either direction with the cab in any position; steered by hydraulic power; and has air brakes on all wheels. The rugged undercarriage is built by Six Wheels, Inc., Los Angeles, Calif.

While the Zephyrcrane is not available except for war duties at the present time, many contractors are probably already filing away information about the latest developments in construction equipment for future reference, and we therefore bring you this news about the Zephyrcrane and its adaptability for peacetime jobs to come.

H. O. Penn Heads New Distributor Company

The Michigan Tractor & Machinery Co., with headquarters at Detroit and a branch at Grand Rapids, has been organized to serve as distributor for Caterpillar and allied machinery and equipment in the Lower Peninsula of Michigan. The new company is headed by H. O. Penn, President of the H. O. Penn Machinery Co., Inc., of New York City, and until recently Supervisor of the Tractor and Used Construction Machinery Division of the War Production Board. The Vice President of the new



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firm is G. E. Rinck, who has been Eastern Sales Manager for Caterpillar and was formerly Vice President of the Minn-Dak Tractor & Equipment Co. at Fargo, N.D. R. E. Reed, former Deputy Procurement Officer in Pennsylvania and WPB Chief, Used Construction Machinery Section, is Secretary-Treasurer.

A major portion of the personnel of the Keller Tractor & Equipment Co., former distributor for Caterpillar and allied manufacturers, has associated itself with the Michigan Tractor & Machinery Co. Don F. Nickel has been named Manager of the branch at Grand Rapids; Louis Eilertsen will continue to handle the northern and central Michigan territory; Harry Armstrong is representative in the Detroit district; and Ferd Koss has been appointed Service and Parts Manager for Detroit.

The new company is located at 14341 Schaefer Highway, Detroit. A branch office at 1239 Buchanan St., Grand Rapids, was formerly occupied by Keller Tractor & Equipment Co. Both are modern up-to-date establishments carry-

ing complete stocks of parts and equipment, with ample parts and service facilities for providing the best possible servicing of machinery to "keep 'em working."

New Pipe Line to East Advancing on Schedule

Battling spring mud in the valleys and late snow in the mountains, construction crews on the 24-inch war emergency pipe line have crossed the 200-mile mark on the 809-mile march from Illinois to New York and Philadelphia, Administrator Harold L. Ickes announced recently. Actual pipe laying is now in progress on all of the seventeen working spreads into which the work has been divided, and with an even break on the weather this spring, it is expected that the big pipe line will reach its refinery terminals on schedule.

According to reports from the construction headquarters of War Emergency Pipelines, Inc., builder of the

pipe line for the Government, heavy rainfall over the entire route of the eastern extension of the line has severely hampered recent operations. Numerous rivers as well as smaller streams have been at flood stage, making work on adjacent lines impossible.

The actual mileage of the pipe line, previously reported to be 1,385 miles, has been reduced during construction by an overall straightening of the route by securing more favorable right-of-way. The schedule calls for oil to be flowing into the eastern refineries and storage terminals by early summer. Capacity operation at a rate of 30,000 barrels a day is expected shortly after the start of full Texas-East Coast pumping operations. Twenty-five pump stations will drive a continuous stream of oil over the 1,340-mile route.

However, officials of the Petroleum Administration have reiterated the warning that there is still no assurance that civilian supplies of gasoline and heating oil will be more ample next winter than they have been the past winter.



STRIKING POWER abroad needs productive power at home. To keep productive machine hours up and overhaul lay-offs down in the **CONSTRUCTION** field use

... SINCLAIR SPECIALIZED OILS and GREASES. These products give equipment *correct* lubrication that keeps wear negligible in the most punishing service.

Write for "The Service Factor"—a free publication devoted to the solution of lubricating problems.



PART of equipment of C. S. Foreman Company working on Federal pipe line project "Somewhere in Missouri." All equipment used on a 68-mile section was lubricated with Sinclair products.

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A Grade Separation To Sort War Traffic

James Road Overpass at Columbus, Ohio, Spans Three Railroads and Access Road To Air Field and Plant

LATE in 1942, a contract was awarded by the Ohio Department of Highways for a \$540,000 overpass project of major importance to protect heavy vehicular traffic from delays and the hazards of crossing three main-line railroad tracks of the Baltimore & Ohio, the Pennsylvania, and the New York Central Railroads. The project, referred to as the James Road grade separation, Project DA-WR1, includes a relocation of James Road to the west of its present site on the south side of the railroad tracks to connect with Stelzer Road on the north side of the tracks. A bridge spans the tracks of the three railroads at the point where the tracks cross each other, thus eliminating one overhead structure. North of the tracks, ramps connect with Fifth Avenue, running east and west, which is the main access road for motor traffic to and from Port Columbus and the local Curtiss-Wright airplane plant. A bridge spans Fifth Avenue and then traffic may proceed north on Stelzer Road, turn east onto Sixth Avenue going toward Columbus, or turn west onto Seventh Avenue crossing the extension of James Road, which runs in a north-east direction, and eventually connecting with Fifth Avenue.

Roadway Plans

The roadway, totaling about 1 mile of construction, consists of two 26-foot concrete pavements of 8-inch plain concrete with a 4-foot black-concrete medial strip. The pavement slopes 3/16 inch per foot to the outside gutter which terminates in a 6-inch integral curb.

Structures

The main structure is a 6-span reinforced-concrete and steel-beam superstructure with a 7½-inch deck having a crown slope the same as the pavements. The structure is built with five piers and two pile abutments, with the piles driven through the approach embankments. Because of the character of the area

spanned by the structure, a railroad crossing, the spans vary with no two the same length; 56 feet 9 inches, 70 feet 3 inches, 70 feet 6 inches, 55 feet 2½ inches, 86 feet 1 inch, and 55 feet 2½ inches. A 15-foot reinforced-concrete approach slab 9 inches thick at either end of the structure rests on the pile abutment and on the approach fill. This structure provides a 22-foot minimum clearance over the top of the rails.

The two 26-foot roadways and the 4-foot medial strip are carried over the bridge which measures 72 feet out-to-out of the railing. There is a 6-foot sidewalk on each side of the bridge with a concrete guard rail having end posts 1 foot 8 inches thick and intermediate posts 1 foot square.

Span 1, 56 feet 9 inches, has a rein-

forced-concrete beam 4 feet 10 inches deep, including the deck. Spans 2 and 3 are of 36-inch wide-flange 194-pound I-beams with 30-inch I-beams under the sidewalk and medial strip. Spans 4, 5 and 6 have arched reinforced-concrete beams with an 8-inch deck.

The Fifth Avenue underpass is a separate structure built as a rigid-frame concrete structure over a 56-foot roadway divided by a 4-foot medial strip. Beneath the structure there are two 6-foot sidewalks. The span of the structure is 68 feet face-to-face of abutments, with the arch 2 feet 1 inch thick at the center and 4 feet 7 inches at the haunches.

Quantities

The major estimated quantities for the roadway portion of the contract were:

Excavation, unclassified	21,188 cu. yds.
Borrow	156,059 cu. yds.
Water, for compacting fill	751,000 gals.
Plain concrete pipe, 6 to 24-inch	5,603 feet
Concrete, for 4-inch sidewalks	4,971 sq. ft.

The major estimated pavement quantities for the dual concrete roadways and
(Concluded on page 21)

JOHN PAUL JONES said:

'I have not yet begun to fight'



Fight with War Stamps & Bonds



35,000
Gallons

Poured in 10 HOURS!

Between November 3rd and December 23, 1942, the 1000-gallon Model 400 distributor owned and operated by the Arizona Sand and Rock Co. of Phoenix, Arizona, applied the bituminous material on over 640 acres of runways on main and auxiliary air fields in the Pacific Southwest. On one airfield alone, this distributor poured 2000 gallons of asphalt in 20 minutes.

C. W. Kelly, president of the Arizona Sand and Rock Co., reports, "Since we have owned this piece of equipment, it has continued to perform very satisfactorily and the quality of

the work turned out has been excellent."

J. M. Krumpton, the operator, adds his remarks as follows, "I have been running road machinery for the past 15 years, and road oilers for the last three. The combination on the full circulating air operated spray bar of from two to twenty-four foot strips, combined with the set-up for blowing the lines with air, in addition to washing them with fuel oil makes us absolutely certain that the unit is going to be ready to go the next time we are ready to operate. I back my statement that this is the best rig I have ever worked."

Write us today for the name of your nearest dealer and additional information covering our Model 400 distributor.

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GATKE High-Heat-Resisting Asbestos Brake Materials are engineered and service-proved for every brake and clutch requirement of Excavating, Road Building and Construction Equipment. Just tell us what you need.

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C. & E. M. Photo
A special elevated Rex 14-S concrete mixer for pouring footings and warehouse floors at a Southwest Ordnance Depot.

Portable Mixer Pours Concrete at Army Base

(Continued from page 1)

mixer could be held at the most effective height for operating the chute. To raise the mixer, four jacks were used and pins inserted through the holes. To steady the outfit while operating, four spuds at the corners were made of pipe with holes in the inner and outer pipes to regulate the height of the spud. At the right side of the truck is the skip operated by the regular mixer hoist powered by a LeRoi engine and running on a track of angles which can be extended or shortened as required by the height of the tower when operating. At the left side is the chute which can be extended to 30 feet and is equipped with a shut-off gate at the end so that the entire length of the chute can be used for the storage of concrete when using concrete buggies for carrying the mix away. On some jobs a transfer buggy hopper is used if more convenient. The chute swings 180 degrees, making the operation of the machine very convenient and eliminating many moves with the trucks while the tower is in the raised position.

Pouring Warehouse Floor

For pouring the concrete floor of an Ordnance warehouse, the rig was stopped near one end and, as the work progressed down the warehouse, the mixer was moved, but not until the economical limit of run for the concrete buggies had been reached. The dry

batches were delivered by 5-batch trucks and emptied into the skip at ground level with the aid of two skip men. The mixer operator ran the skip up to the mixer elevation where it automatically dumped into the Rex 14-S mixer. The concrete was given a 1½-minute mix and delivered to the long chute held at

the proper level by a pair of chains. One chute man cut off the flow at the end of the chute as one of the four concrete buggies was filled and the next moved into place.

The warehouse floor was poured 5 inches thick with expansion joints every 40 feet and in sections 20 feet square. The buggies dumped their loads onto the compacted cinder base for the concrete as one man lifted the fabric reinforcing with a hook to permit the concrete to flow beneath. The screed guides were 2 x 4's set 1 inch above the ground and about 10 feet center to center. Two men spaded and shoveled the concrete as dumped while two others used a 2 x 4 as a strike-off and then went over the surface with a channel as a float. Three finishers completed the section of floor, using a long-handled float, a sleeve-board-type float, and at last edging the joints for later pouring with asphalt. Another man pulled out the 2 x 4 screed boards as soon as the concrete had been struck off in that section.

The elevated mixer was used very

effectively for many operations where it was not easy to pour in any other manner. The long adjustable chute was very effective in pouring footings and narrow stub walls and the ease with which the truck could be moved ahead made the progress of the work very rapid.

Personnel

The warehouse construction on which this elevated mixer was used was done by contract under the direction of the U. S. Engineer Department. In the interest of national security, reference to the location of and personnel connected with U. S. Army construction is omitted.

Dixie-Vortex Changes Name

Announcement has been made of the formal change of name of the Dixie Vortex Co., Chicago, Ill., to the Dixie Cup Co. The company will continue to produce its line of paper cups and Dixie Vortex water tanks and cup dispensers.

A BEAR FOR PUNISHMENT!

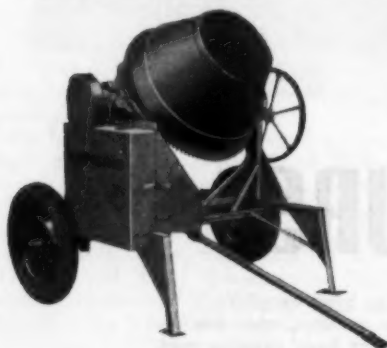
—and it doesn't "hole-in" during the off-season

Walter Tractor Trucks

CONTINUING where they left off fighting winter snows, Walter Tractor Trucks carry on with the tough jobs of Spring, Summer and Fall. Jobs like road building, repair and maintenance—off-the-road work—construction projects—and emergencies, all of which require the unfailing power-plus-traction of Walter 4-Point Positive Drive.

On soft dirt, mud, sand, ruts or stiff grades, the Walter's FOUR powerful driving wheels meet the test without bogging down, slipping or stalling. To handle these jobs, where conventional trucks fail or falter, Walter Tractor Trucks embody such features as patented automatic locking differentials, suspended double reduction drive, tractor type transmission and many others. Write for detailed literature.

WALTER MOTOR TRUCK CO.
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Lansing
Concrete Mixers
Concrete Carts
and
Wheelbarrows
Have Gone to War!

Their sale is restricted but we can still sell them under certain conditions.

Write for complete Catalog.
LANSING COMPANY
LANSING, MICHIGAN
BRANCHES IN EIGHT PRINCIPAL CITIES

Building a Battalion Of the Navy Seabees

Process of Creating a Unit
Of Specialists Described
After Inspection of Camps
Peary and Endicott

(Photos on pages 32 and 33)

THE outstanding construction organization that has developed in World War II is the Navy's Construction Battalions, the Seabees. Although the idea of a self-contained mobile construction unit able to fight as well as build originated toward the close of World War I, the actual mobilizing of these battalions was not started until the present war. It is said that a Seabee Battalion can do anything with tools—from repairing a watch to building a bridge, or aiding the Marines at Guadalcanal.

Seabees are enlisted chiefly from construction personnel, welders, equipment operators and service men, surveyors and the like. Given their basic training of six weeks with 12 classes, usually at preliminary training camps in Virginia, they complete their second six weeks of technical and military training at Camp Endicott, Rhode Island. This camp, named for Rear Admiral M. T. Endicott, "father of the Civil Engineer Corps of the Navy", was formally dedicated April 4, 1943, although it has been in use since August, 1942. Here the men are given training in 27 advanced technical courses and are formed into the fighting-building battalions that pack the sting of the Seabee and his ability to make, to destroy, and to repair anything.

The Training System

Upon arrival at Camp Endicott, the enlisted man fills out a "Technical Training Data" report giving his education, naming the industrial courses he has taken and his previous technical training in a Navy Construction Training Camp. He records his experience in the trades at which he has worked and indicates the work he is best qualified to do. On the back of the card are listed 30 activities, such as the operation of high-pressure air compressors, piping installation, equipment lubrication, the operation of excavation equipment, the repair of diesel and gasoline engines, pile driving, etc. He records the number of years he has worked at each of these occupations and the one in which he was last engaged. With this information at hand, the Personnel Office is able to determine the training which should be given to the man to produce technical experts in the shortest possible time, and thereby permit the longest possible military training in the 6-week course.

Practically every trade is represented in a single battalion of 1,300 men as finally organized, with not less than six men in each of the technical fields covered by the training schools operated at Camp Endicott. A Training Coordination Daily Report is made by each school, showing the battalions represented in the class, the sections of instruction covered, the motion-picture

training films shown, and the type of work done, whether in the field or in the shop. As each class from the battalion completes its specified course of training in a particular school, the men are assigned to the proper billets to complete the building up of the necessary distribution of technical ability in each battalion.

The types of schools operated at Camp Endicott with the number of sessions, which are 1/2 day each unless otherwise noted, are as follows: Diving, 30 periods; Signal school, 30 periods; Fire fighting, 12 periods; Huts and carpentry, 30 periods; Camouflage, 23 periods; Photography, 7 periods; Drafting, 12 periods; Demolition, 30 periods; Sub-grade construction, 29 periods; Water procurement, 29 periods; Heavy-equip-



Official U. S. Navy Photo
Practical work of the men in the Tanks and Masts School at Camp Endicott, N.C.T.C.
Assembling a 10,000-barrel steel tank in the field.

ment servicing, 30 one-day periods;

(Continued on page 24)

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Just published — a booklet giving wartime maintenance information for owners of Athey Forged-Trak Trailers and Logging Cruiser Wheels — to help you get longer service from your present equipment. It explains ways to make emergency repairs that save time and vital war-needed materials — suggests steps to follow in the operation of your machines which insure longer life, lower upkeep. Illustrated with pictures and sketches, this booklet contains condensed, helpful facts that Athey owners and operators can put into immediate use. Get your copy of this booklet right away. Ask your Athey-"Caterpillar" Dealer, or mail the coupon at the right direct to Athey Truss Wheel Co., 5631 W. 65th St., Chicago, Illinois.

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State Post-War Plans For Highway Projects

(Continued from page 2)

duce the planning for its post-war program.

California has fifteen DHA projects approved in or near Los Angeles, Oakland, Richmond and San Francisco, totaling \$17,500,000.

Connecticut is planning to design about \$30,000,000 of highway and bridge projects, a three years' normal program, during the next biennium. Four DHA projects have been approved, totaling \$3,625,000.

Delaware is planning a program of resurfacing 170 miles of old pavements, widening 84 miles of narrow pavements, and approximately 65 miles of new construction and bridges. These projects total over \$10,000,000.

District of Columbia has two DHA projects in and around Washington already planned and approved, totaling \$2,437,000.

Idaho already has fourteen DHA projects approved in or near Boise, Coeur d'Alene, Lewiston, Pocatello and Sandpoint, totaling \$3,575,000. Further projects covering 185 miles are in course of preparation for submission to P.R.A., to include nine grade crossings and seven bridges as well as seven by-pass projects.

Illinois is planning to spend approximately \$100,000,000 to rebuild its primary road system, involving 701 miles of 2-lane pavement, 110 miles of 4-lane and 66 miles of other pavement, 75 miles of surfacing, 115 miles of grading, 165 bridges, 14 highway grade separations and 100 railroad grade separations. This program also includes \$2,900,000 for work on 159 miles of secondary roads not included in county highway systems. Plans are already approved under the DHA for twenty-one projects in and around Alton, Centralia, Chicago, East St. Louis, Effingham, Peoria, Rockford, Rock Island and Springfield, totaling \$19,739,000. The ultimate program will be near \$250,000,000 and will be extended over a number of years.

Indiana plans to cover nearly one-half the state highway system in a \$160,861,000 post-war program of road and bridge construction which will require 10 years to complete. The largest project

will be completion of the remaining 49 miles of the 60-mile belt highway around Indianapolis.

Iowa expects to expend about \$425,000 to acquire right-of-way and make plans for post-war construction.

Kansas has a DHA-approved program for twenty-one projects in and near Junction City, Kansas City, McPherson, Newton and Wichita, totaling \$11,342,000, and by the end of 1943 expects to complete plans for a volume of work which would extend over several post-war years. Surveys are complete for 424.8 miles of construction to cost about \$16,760,000 but no plans are ready yet. Plans are nearing completion, however, for a total of \$23,615,318 on 455 miles of highway and work could be started immediately on 139.1 miles of surfacing included in this figure.

Kentucky has seventeen DHA projects approved for construction in or near Covington, Earlington, Elizabethtown, Frankfort, Hopkinsville, Lexington, Louisville, Madisonville, Olive Hill, Paducah, Pikesville and Winchester,

totaling \$7,250,000. Surveys are underway to extend this program so as to have a normal 2 or 3-year program ready for letting as post-war projects.

Louisiana has already received approval of fourteen projects in and near Baton Rouge, Hammond, Lake Charles, New Orleans, Opelousas and Ponchartroula, totaling \$5,719,000, under the DHA which includes another bridge across the Mississippi River at New Orleans.

Maine is making plans for bridge and highway projects which will cost over \$10,000,000 and include 125 miles on Federal-Aid highways and 53 miles on the secondary system. Plans have already been approved for nine DHA projects in or near Augusta, Freeport Village, Pembroke Village, West Pembroke and Winslow, totaling \$2,150,000.

Maryland has a \$40,000,000 post-war program which includes two bridges, one across the harbor at Baltimore, Md., and another over the Potomac River. Plans have been completed for about one sixth of a 240-mile highway program to cost

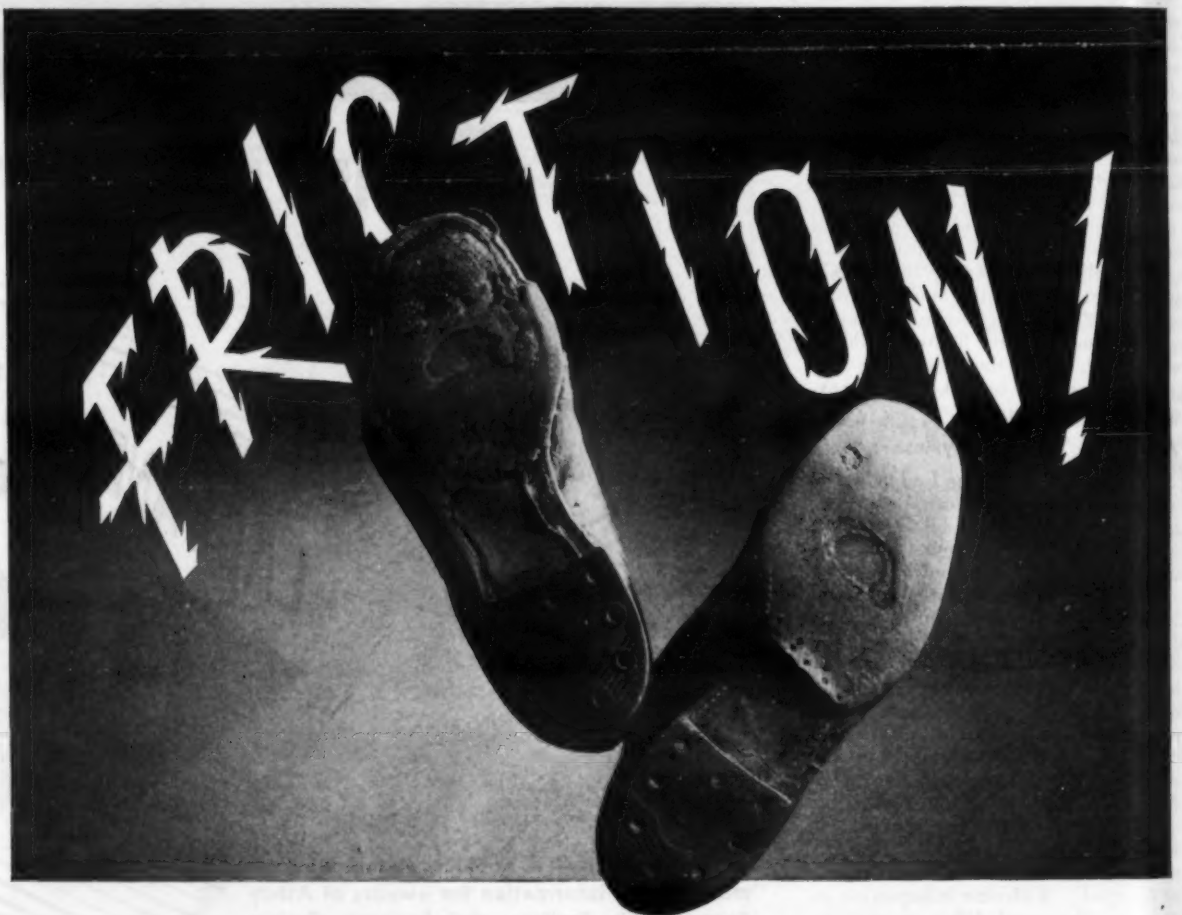
about \$25,000,000.

Massachusetts already has three approved DHA projects for work in or near Boston, Gloucester, Palmer, Springfield, Westfield, West Springfield and Wilbraham, totaling \$6,551,000. Planning is at such a stage that \$2,500,000 of projects could be advertised the day following the end of war, and another \$3,500,000 of projects within three months. Another \$6,000,000 could be added at the end of another three months. These include grade-crossing eliminations, paving on the strategic network, dual-lane highways and by-passes.

Michigan has two DHA-approved projects, totaling 56.2 miles, at a cost of \$15,145,000.

Minnesota is using its remaining available staff for planning post-war projects which will cost close to \$35,000,000 and include a maximum of 700 miles of grading, 500 miles of stabilized-base and bituminous surfacing, 250 miles of concrete paving and probably about 45

(Continued on next page)



REDUCE WEAR AND REMOVE CARBON WITH MACMILLAN RING-FREE MOTOR OIL

Undue motor wear, waste of fuel and excessive carbon have no place in a sound preventive maintenance program. At the same time, "production" must be speeded up. That's why operators simply must pay more than usual attention to motor lubrication ... and motor cleanliness.

Macmillan RING-FREE Motor Oil cuts down waste and wear while speeding up performance, and at the same time, RING-FREE removes carbon!

In 1094 Certified Road Tests, with various makes of owner-driven cars, 10 per cent increases in gasoline mileage were not uncommon after crankcases were drained and refilled with RING-FREE. As indicated by these tests, the average immediate saving was 1.3 miles per gallon! These tests emphasize that RING-FREE lubricates better ... reduces friction faster. It delivers direct to the drive shaft more of the horsepower ordinarily wasted in overcoming motor friction. It postpones "down-time" for repairs.

Macmillan RING-FREE Motor Oil combines all these qualities: great film strength, high heat resistance, long cling to metal, fast penetration ... plus the fact that it is non-corrosive, is less affected by dilution and it removes carbon.

CARBON REMOVAL A NATURAL RING-FREE FUNCTION
Macmillan RING-FREE Motor Oil actually removes carbon while the motor runs! Hence, by its continued use, pistons, rings,

valves—all vital parts—stay cleaner. Carbon removal is a natural function of RING-FREE, inherent in the crude oil and retained by the exclusive Macmillan patented refining process, without the use of additives.

TO SUM UP: MACMILLAN RING-FREE gives more horsepower to the drive shaft—tangible saving of fuel—allows less wear on hard-to-replace engine parts—it removes carbon.

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Plans Now Under Way For Post-War Highways

(Continued from preceding page)

bridges.

Mississippi already has six DHA projects approved for construction in or near Albany, Corinth, Meridian and Terry, totaling \$837,500.

Missouri has a 51.7-mile highway project in St. Louis, including the extension of the present express highway, another large project in Kansas City and ten projects totaling \$14,053,000 already approved under the DHA for post-war construction.

Nebraska has twenty-six projects approved under the DHA, totaling \$2,988,000. This work will include road, bridge and grade-separation construction.

Nevada has set up a six-year program which, under present conditions, cannot be carried on until after the war. Nine projects have already been approved under the DHA for construction in or near Las Vegas, Reno and Sparks, totaling \$2,164,000.

New Hampshire has no extensive program for post-war construction prepared as yet but has three projects, totaling \$2,437,000 approved under the DHA for construction in or near Concord and Manchester.

New Jersey has an extensive program of public works construction proposed by the State Planning Board for post-war construction, to include a considerable program of highway construction aimed at expediting the flow of intrastate traffic. One of the major projects is a 3 to 5-lane parkway which will connect George Washington Bridge with the New York highways leading to Bear Mountain Bridge. This will include 10 to 12 miles of highway in New Jersey and, continued through New York State, would total 45 miles. Plans have already been approved under the DHA for a project between Elizabeth and Jersey City to cost \$6,368,000.

New York has established a State Commission for Post-War Public Works Planning which is assembling information on post-war construction projects. One project under discussion is a "throughway" to bisect the state from Lake Erie to the Hudson River and thence down the Hudson Valley to New York City, all with a 200-foot right-of-way. Already eleven highway projects have been approved under the DHA totaling \$24,105,000, for construction in or near Albany, Buffalo, New York City, Rochester, Schenectady, South Amsterdam, Syracuse and Utica.

North Carolina has been somewhat slowed up in its surveys and plans for post-war projects, but has completed plans for ten DHA projects totaling \$1,627,000 in or near Charlotte, Clinton, Greensboro, Greenville, Highpoint, Thomasville and Wilson.

Ohio is preparing plans for approximately 130 miles of highway construction to cost \$70,000,000, over 100 structures to cost a total of \$11,000,000, and has asked P.R.A. for \$350,000 to be matched by the state to pay for preliminary studies and plans for an additional 162 miles of highway construction to cost in the neighborhood of \$100,000,000. In these projects particular attention is being given to alleviating the most critical traffic problems in the state, particularly in the Cleveland area where an integrated freeway system to solve permanently the major traffic ills of that area is being worked out by the State Department of Highways and the Cleveland City Planning Commission. Already eleven projects totaling \$16,200,000 have been approved for post-war construction under DHA in or near Akron, Cincinnati, Cleveland, Columbus, Lima and Mansfield.

Oklahoma already has a pool of highway projects including \$95,000,000 of essential construction covering 440 miles

(Concluded on page 58)

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ELIMINATED DRIER—Midwest airport paved last year with Barber-Greene traveling plant using wet aggregate and no drier!

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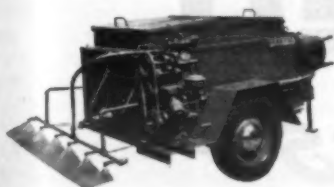
on your Bucyrus-Erie 4-Wheel Scrapers



BUCYRUS-ERIE 4-Wheel Scrapers have exceptionally low rope wear. But even so, it is important to make your rope give maximum service. A little special care is all that's necessary—study the suggestions listed below.

FOLLOW THESE SIMPLE RULES

- ★ Check all the cable leads regularly to see that ropes are properly aligned to prevent any undue rope wear.
- ★ If a sheave-stand becomes bent be sure to straighten it immediately, before the off-lead damages or cuts the cable.
- ★ Disassemble and clean the sheaves regularly so as to keep them working smoothly and prolong their life.
- ★ Save cable by avoiding unnecessary stress. Do not travel with ejector, apron or bowl hoisted to extreme height.
- ★ Replace sheaves when they become worn to a point where they may damage rope. Bucyrus-Erie sheaves are identical and interchangeable on most models.
- ★ Your International TracTractor Distributor is equipped to do a service job as never before to help you prolong the useful life of your equipment.



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TRACTOR EQUIPMENT

SEE YOUR
INTERNATIONAL TRACTRACTOR
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Making Equipment Last Longer by Hard-Facing

Because of the heavier loads and longer service periods to which construction and road maintenance equipment is being subjected today, it is reported that it is wearing out faster than ever before. The difficulty or impossibility of securing new equipment, and in many cases of obtaining new parts, makes this situation even more acute. One of the solutions of this problem is the protec-

tion of parts subject to wear or the restoration of worn parts by hard-facing.

A new booklet entitled "Hard-Facing with Coast Metals" describes Coast Metal hard-facing welding rods and suggests ways of extending the life of your equipment. The booklet also includes a table showing the properties of the various rods, indicating the use to which they are particularly adaptable.

Copies of this booklet may be secured by interested contractors and state and county highway equipment men direct

from Coast Metals, Inc., 1232 Camden Ave., S. W., Canton, Ohio. Just mention this item.

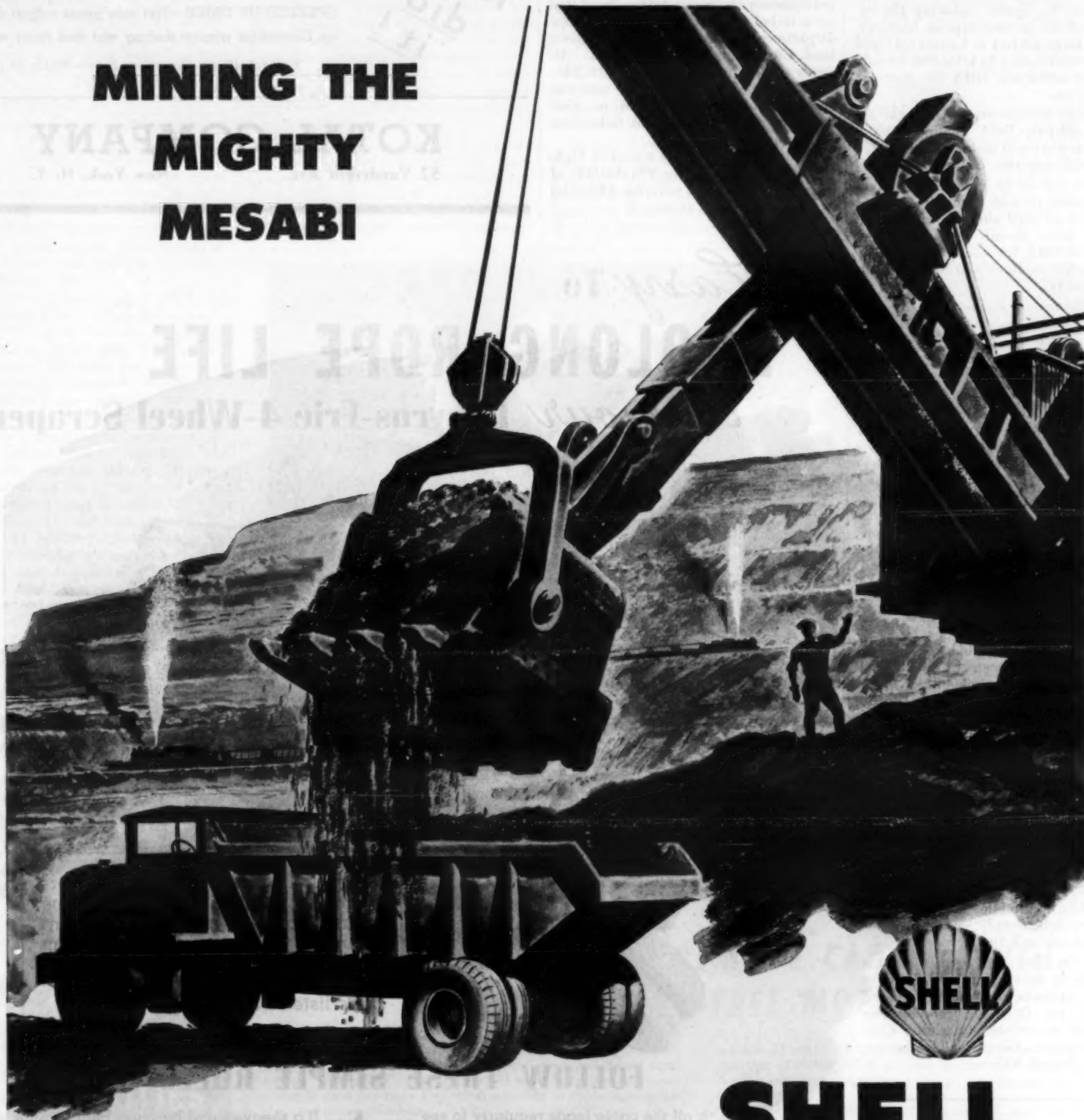
Road Construction and Maintenance Equipment

Three of the Littleford units for road construction and maintenance are described and illustrated in a new folder recently issued by Littleford Bros. Inc., 485 E. Pearl St., Cincinnati, Ohio. These units for constructing and repairing

highways, streets, and airport runways include the Model 84-HD tar and asphalt kettle, available with hand or motor spray attachment; the Model No. 155 Trail-o-Roller, a portable motorized roller giving as much compaction as a 5-ton tandem roller; and the No. 101 utility spray tank, equipped with spray bar, hand spray and pouring pot outlet.

Copies of this folder may be secured by interested contractors and state and county highway engineers direct from the manufacturer.

MINING THE MIGHTY MESABI



MORE than 66,000,000 tons of iron ore were removed in 1941 from the fabulous Mesabi Range in Minnesota. Under war pressure over 70,000,000 were mined in 1942, while officials estimate the 1943 tonnage will be substantially higher. It is significant that most of the trucks, tractors and shovels operating on the Mesabi Range use Shell Lubricants and Fuels.

Let us show you how Shell can fill your Diesel needs.



SHELL DIESEL LUBRICANTS

For Heavy Duty

Make Safety Posters Really Work for Safety

Use Only Posters Which Apply to Your Job; Select Those Which Have A Specific Message; and Change Them Frequently

By A. E. LEWIS

♦ MANY foremen and superintendents who themselves are completely sold on safety education are having difficulty getting their messages across to their men. Throwing their hands up in despair, they will tell you of the safety instructions given to each man, of the numerous warnings posted throughout the job, and then they will point to a report of a recent avoidable accident. Of course, in their impatience with a blundering accident, they forget the great many "accidents that have not happened" due to proper safety posters. But often safety posters themselves are not doing an all-out job. If they are not, it is time you studied them carefully. Find out not only what they are saying, but to whom they are talking. When posters are not doing a satisfactory job, it is invariably because they are misused.

Here is a first-class example. An excellent dynamite-injury placard, showing a miner being blown to "kingdom come" after loading a hot "snake hole", was posted, of all places, in a warehouse frequented only by clerks and warehousemen. More than that, the company carried absolutely no blasting supplies, and had not employed a miner for two years. Some one gave them the sign, so they hung it up!

If you want to use safety posters effectively, analyze your job and its dangers. Find the posters that definitely educate along these lines. Be certain that your signs contain illustrations of objects with which your men are familiar. Use specific and "to the point" captions. There are thousands of safety posters and usually you can find one that contains the message you want to put over. If not, you can have one made.

One thing to avoid is the promiscuous use of general and irrelevant signs. Safety posters with a general theme have a purpose; they are excellent reminders. They are best used as an auxiliary to more specific warnings or in connection with an educational campaign or merit system.

This does not mean to use fewer signs. Use more, but use them intelligently—carefully stressing the lesson you wish to give. Repetition is the surest means of emphasizing a point. However, in order to avoid boring your reader and harming your message, the same lesson must each time be clothed in a new illustrative poster and your posters should be changed frequently.

The final word, and maybe the most important, is to use interesting and compelling signs. Remember "safety" is only a word, and an abstract one at that. Telling a man to practice safety is not the same as telling him to practice the piano. You can show him the piano. It is your responsibility as an efficient leader of men to imbue the word "safety" with similar concrete meaning. You can do so by linking it with your employee's job, his home, his habits, his hobbies—that is, with the physical objects he already knows and understands.

Orphan Electrode Stubs Adopted by N. Y. Schools

A quantity of electrode stubs accumulated by a manufacturer recently came into the possession of the New York Board of Education for use in the city's manual training classes under rather unusual circumstances. The stubs were

originally destined to be melted but they were requested for use in the training of welding operators in the New York City schools.

At a meeting in New York sponsored by several engineering societies and held at the request of the War Production Board to discuss various manufacturing problems, E. Vom Steeg, Jr., General Electric welding specialist, gave a talk outlining various ways in which electrodes can be conserved, and the importance of doing so. At its conclusion, a representative of a manufacturer with an accumulation of electrodes asked to be heard. He explained the circumstances under which the stubs were accumulated on a particular job on which it is impossible to use more than 8 inches of a 14-inch electrode.

Mr. Vom Steeg suggested that the manufacturer get in touch with welding schools since these schools are finding it increasingly difficult to obtain electrodes for use in training welders for war work. At this point a member of the New York Board of Education offered to adopt the orphan stubs, explaining that they would prove invaluable in the city's manual training schools.

New Tractor-Truck For Trailer Tanks

Typical of the new vehicles of the future for which we must plan our highways is the new giant 10-wheel tractor-truck chassis being produced by Reo Motors, Inc., Lansing, Mich., for the

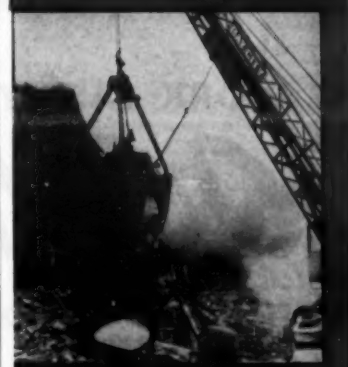
Army Air Corps to be used with tank trailer equipment for aircraft refueling. The combined weight of the tractor-truck tank-trailer, complete with full load, is 60,940 pounds. This unit is powered by an 855-cubic inch engine with power applied to all ten wheels through three axles, one in front and two in the rear. Extra traction for tough going is provided by heavy-duty 10.00 x 22 cross-tread tires.

These vehicles, it is pointed out, are built to travel, under normal conditions, 35 miles an hour and to negotiate in high gear grades in excess of 3.9 per cent. Though designed for Army use now, such vehicles may well be adapted to peacetime aviation needs and for the transportation of gasoline and fuel oil in the days of peace ahead.

Clamshells

versus

Bombshells

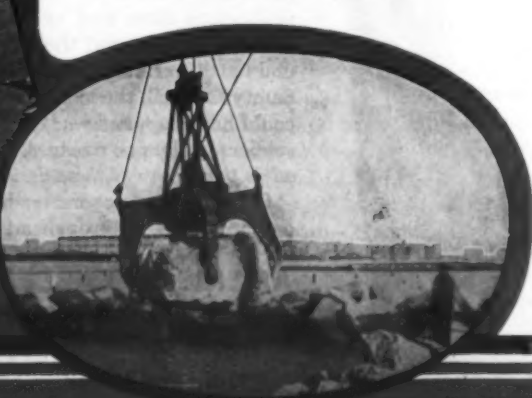


OWEN
BUCKETS
& GRAPPLES

SINCE DEFENSE and OFFENSE begin with construction, Owen Buckets and Grapples are predominantly in the forefront of activity in plants and fortresses throughout the world.

Their efficiency will aid in speeding production—in lessening the effectiveness of bombs and shells—and in speeding the inevitable day of victory.

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THE OWEN BUCKET CO.

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Emergency Reservoir Protects Army Depot

Construction of Concrete Storage Supplements the Existing Tanks; 315-Yard Monolithic Pour of Walls

ON a site between an existing pumping station and the main street in an important Midwest Army Depot, a new reinforced-concrete reservoir was constructed last summer to provide, with a new well and the rebuilt pump station, additional storage facilities and an emergency water supply. Greatly increased activities and personnel at the Depot, plus the inability of the city to provide additional service, made this construction necessary.

The feature of the job was the pouring of four heavily reinforced concrete walls of the box as a monolith, requiring 315 cubic yards of truck-mixed concrete placed by two cranes which circled the 64 x 85-foot reservoir. The pour was started at 9 a.m. and completed at 5:30 p.m. without any breakdowns or other loss of time.

General Design

The inside dimensions of the storage reservoir are 61 feet 3 inches x 82 feet x 21 feet deep. The walls are 10 inches thick at the top, 18 inches at the bottom and 21 feet 8 inches high. The wall footings, which are continuous, are 3 feet 6 inches wide with an offset at the ten pilasters. The vertical reinforcing in the walls consists of $\frac{7}{8}$ -inch round bars on 6-inch centers on the outside, with vertical inside bars $\frac{3}{4}$ -inch round on 8-inch centers. The horizontal bars are spaced varying from 4 to 8 inches, using $\frac{3}{4}$ -inch round and $\frac{5}{8}$ -inch round on the inside and 1 to $\frac{5}{8}$ -inch bars on the outside. The vertical bars in the pilasters are 1 and $1\frac{1}{8}$ -inch square bars totaling twenty, tied with a pair of alternated square spirals.

The reinforced-concrete floor is a 7-inch structural slab with a 1-inch hand-finished topping. It is reinforced at the top of the slab with $\frac{3}{8}$ -inch round bars spaced 12 inches on centers both ways, and on the bottom with $\frac{1}{2}$ -inch bars at the same spacing. The floor was poured flat with no drains except the 8-inch cast-iron drainage line and two 8-inch cast-iron overflow pipes with bell tops.

The six interior columns, 18 inches square, are set on 6-foot 4-inch square footings which are tied together with 16 x 18-inch beams below the floor elevation. The column reinforcing consists of eight 1-inch round bars at the corners and center of the sides. The tie beams

have 14 bars 1 inch square.

The roof slab is an 8-inch flat slab with a drop panel and mushroom caps over the interior columns. It is reinforced two ways with $\frac{5}{8}$, $\frac{3}{4}$ and $\frac{1}{2}$ -inch round bars on variable spacing.

Wall Forms and Pouring

The forms for the monolithic pour of the walls consisted of 8-foot panels 22 feet high of $\frac{3}{4}$ -inch plywood with 2 x 4-inch studs on 12-inch centers and double 2 x 4-inch wales spaced 2 feet. These forms, inside and outside, were held securely by Dayton Sure Grip ties which served both as ties and spacers. These were placed on approximate 2-foot centers both ways.

The monolithic pour was required to eliminate joints in the finished concrete

and insure a water-tight box. This 315-yard pour was effected by using a fleet of seven Jaeger $2\frac{1}{2}$ -yard truck mixers. The concrete was made with $\frac{3}{4}$ -inch gravel and had a 6 to 7-inch slump. The concrete was chuted into Insley side-dump buckets and then raised by the two cranes to the proper elevation in the walls. Pour holes were necessary at about third points of the wall as the heavy reinforcing would have caused considerable segregation of the aggregates in the 21-foot fall through the steel bars. Chutes were used at the pour holes, and when pouring from the top a narrow plywood hopper was used. In order to insure a dense concrete at the inside forms it was necessary to use some eight men with wooden mallets pounding the forms. The character of the reinforcing, a dense mass of steel with a relatively small volume of concrete, made the use of vibrators impossible. The contractor concentrated his efforts for density on the inside wall and was reasonably successful, while the outer wall showed some minor honey-

combing. The pilasters were poured integral with the walls.

In order to insure a continuous pour, two cranes were installed at opposite corners of one end, a Speedcrane with a 1-yard Insley bucket, and a Moto-Crane with a $\frac{1}{2}$ -yard Insley bucket. With the booms extended as much as possible, the two cranes could reach the entire end and then as the concrete began to rise

(Concluded on page 26)

THOMPSON CONSTRUCTION MATERIALS & EQUIPMENT

CONCRETE CURING MATERIALS
• Hunt Process
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EXPANSION JOINTS
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Write for complete literature and prices
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KILLED OR INJURED AT WORK LAST YEAR—

1,618,000 MEN!

HELP PREVENT MANY ACCIDENTS BY USING

AMERICAN
CABLE

TRU-LAY *Preformed* WIRE ROPE

During the first twelve months of this war more than 1½ million men were killed or injured by industrial accidents. That tremendous loss in productive time and needed man-power undoubtedly prevented the quick winning of several battles. Indeed, according to the National Safety Council, the lost-time through accidents could have supplied war equipment for 110,000 soldiers, sailors or marines. And the shame of it all is that many of these accidents were needless.

One way many operators have reduced time-out accidents is through adoption of TRU-LAY

PREFORMED WIRE ROPE. American Cable TRU-LAY is a safer rope to handle because it is preformed. TRU-LAY is flexible, tractable, willing to do what is required of it without crankiness. It resists kinking and snarling and possesses remarkable fatigue resistance. More than this, broken crown wires in TRU-LAY Preformed do not wicker out to jab and tear workmen's hands. TRU-LAY doesn't ravel (and ruin itself) when cut or broken. For your next line, specify American Cable TRU-LAY Preformed. Do everything possible to reduce lost-time accidents.

AMERICAN CABLE DIVISION

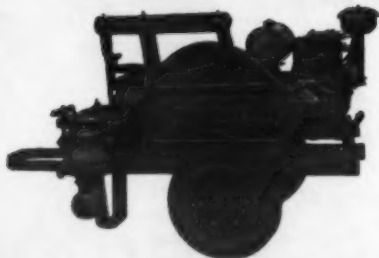
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AMERICAN CHAIN & CABLE COMPANY, INC.

BRIDGEPORT, CONNECTICUT

ESSENTIAL PRODUCTS . . . TRU-LAY Aircraft, Automotive, and Industrial Controls, TRU-LOC Aircraft Terminals, AMERICAN CABLE Wire Rope, TRU-STOP Brakes, AMERICAN Chain, WEED Tire Chains, ACCO Malleable Castings, CAMPBELL Cutting Machines, FORD Hoists, Trolleys, HAZARD Wire Rope, Yacht Rigging, MANLEY Auto Service Equipment, OWEN Springs, PAGE Fence, Shaped Wire, Welding Wire, READING-PRATT & CADY Valves, READING Electric Steel Castings, WRIGHT Hoists, Cranes, Presses . . . In Business for Your Safety

4" Single Mud Hog Pump on Pneumatic Wheels



The "Old Reliable" Mud Hog brought up to date.

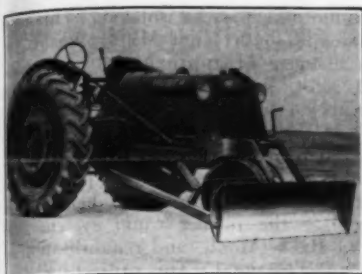
Gearing enclosed—running in oil. All cut gearing.

Die-forged crankshaft in pump.

Available in the ball valve Force type, or the flat valve Open Discharge.

Send for Bulletin No. CEM-40-D.

MARLOW PUMPS RIDGEWOOD, NEW JERSEY



The new Huber bulldozer is compact and ready for any emergency work on highways or airports.

New Small Bulldozer For Emergency Jobs

Built especially to meet war emergencies, the new Huber bulldozer is a small, compact unit designed to swing into action at a moment's notice to fill in bomb craters on airports or military highways and is equally adapted to light maintenance work on road shoulders, highways and airports in peacetime. It is stated that this little machine, smooth in operation and fast in action, levels off broken surfaces promptly with a minimum of cost and a small initial investment. It will do anything a large bulldozer will do, but on a smaller scale in accordance with the jobs for which it is intended.

The moldboard of the Huber bulldozer is $\frac{3}{8}$ inch thick and 6 feet long, and the total width of the blade is 20 inches. The blade clearance in raised position is 22 inches and the depth below ground, 6 inches. The moldboard is hydraulically controlled from the operator's platform and the moldboard and blade are pivoted to push the pole and retaining arms to provide a cleaning action to the moldboard as it is raised. The unit is mounted on a wheel tractor.

Further information on this compact Huber bulldozing unit may be secured from the Huber Mfg. Co., Marion, Ohio.

New Type of "Glue" For War Blueprints

Extensive use of large-scale blueprints by Federal engineers, war construction contractors and industries has resulted in the development of a new casein-bound "paper adhesive" which gives a quick permanent joining, eliminating slippage of the joints, and which will withstand the various baths to which the jointed blueprint paper is subjected while the paper is traveling through the machine. Designated as P-40 Lauexin self-bonding glue, this casein adhesive is made by I. F. Laucks, Inc., 911 Western Ave., Seattle, Wash., and has been used successfully by many large makers of blueprints.

When used in a blueprinting machine, the paper being joined is usually lapped about $1\frac{1}{2}$ inches, and the glue spread by a brush of the same width. The joint is made as the paper is moving into the machine by applying a second paper on top of the glued surface and rubbing the hand over the top of the lap to create contact. The glue bond is made by the time the joint has traveled over the heated roll in the machine, and the joint is then ready to receive the various water baths necessary in this work.

Further information on P-40 Lauexin

UNIVERSAL ARC WELDING ELECTRODES

Steel, Bronze, Hard-facing
Prompt Delivery

UNIVERSAL POWER CORP.

4257 Euclid Ave., Cleveland, Ohio

and where it may be obtained may be secured by interested contractors and engineers direct from the manufacturer. Just refer to this item.

Mechanical Vibrations

This is the title of a new book by R. K. Bernhard, former Head, Department of Engineering Mechanics, Pennsylvania State College, on the theory and applications of mechanical vibration from the point of view of the civil and structural engineer. Requiring very little knowledge of dynamics and utilizing the minimum of higher mathematics, Part I of this book treats physical phenomena and their significance in engineering dynamics, while Part II takes up measuring technique, typical dynamic measuring instruments, and dynamic testing methods.

Copies of "Mechanical Vibrations" may be secured direct from the Pitman Publishing Corp., 2 West 45th St., New York City, or from this magazine. Price: \$3.00.



Specialists in INTERNATIONAL SERVICE...on the Job for You!

MOST International Industrial Power dealers' service shops today are just as busy as the one shown above. Skilled servicemen who are specialists in motor and equipment overhaul are doing their wartime best.

We've always considered International Parts and Service important. Now, they are absolutely essential in keeping International Tractors and Engines on the job.

Wherever your work takes you—wherever you are located—International Service is always close at hand.

International Industrial Power dealers are conveniently located in principal cities, close to centers of construction activity.

Backing up this network of dealers is our coast-to-coast International branch organization. Make International dealers and branches your partners in helping keep your equipment on the job. It will pay you in longer equipment life and less time out for major overhaul and repair.

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POWER FOR VICTORY
INTERNATIONAL HARVESTER

Burns Carbon

Saves Fuel

CARBO-FLO

Carbon Remover

Action is Immediate

Restores Motor Efficiency

Why Let a Motor Knock Itself to Pieces Because of Carbon!! Or Why Take It All Apart Just to Remove Carbon!!!

LET CARBO-FLO CARBON REMOVER CLEAN OUT ALL THE CARBON IN 5 MINUTES!!

CARBO-FLO CARBON REMOVER is a powder that burns the carbon off the valves, pistons and spark plugs. Simple to use—just remove the air cleaner and shake powder from convenient can into carburetor while motor is running.

THE ACTION IS IMMEDIATE. THE EFFICIENCY OF CARBO-FLO CARBON REMOVER WILL AMAZE YOU!!!

One can contains sufficient for any car, truck, or tractor motor. The price is \$2.00 per can. Packed 6 or 12 to the carton.

CARBO-FLO CARBON REMOVER WILL SAVE MANY TIMES ITS COST IN GASOLINE, OIL—AND MOTOR EFFICIENCY.

CARBO-FLO MANUFACTURING COMPANY, 549 West Randolph St., Chicago



MAJOR WAR PRODUCTS BUILT BY INTERNATIONAL HARVESTER

- Half-track Military Vehicles
- Torpedoes
- Artillery Prime Movers
- Automatic Airplane Cannon
- Orlikan Gun Mounts
- Military Trucks
- Military Tractors
- Steel Products for Military Use
- Shells
- Gun Carriages
- Tank Transmissions
- Adapter Boosters
- Airplane Engine Cowling Assemblies
- Trackers
- Gun Loaders
- Marine Corps Invasion Ice Chests
- Blood Bank Refrigerators

New Wartime Bulletin On Blackhawk Equipment

In order to simplify the wartime buyer's job, a new condensed reference bulletin on the line of Blackhawk equipment has just been issued by the Blackhawk Mfg. Co., Dept. 1833, Milwaukee, Wis. The bulletin includes only those Blackhawk products which are available for the duration, as many of their products have been temporarily discontinued.

The equipment covered by this new bulletin includes hand and service jacks, Porto-Power equipment, pipe and conduit benders, and gage equipment. All are illustrated and briefly described, but the entire bulletin has been streamlined and condensed to save time in these busy days.

Copies of this Bulletin V-43 may be secured by interested contractors and state, county and town highway engineers direct from the manufacturer by referring to this item.

WPB Relaxes Stop-Order

A stop-construction order halting work on the Grand Coulee Dam project was partially lifted on April 7 by the War Production Board which authorized construction of a road to replace one which was inundated by high water in the Grand Coulee Reservoir. Relocation of the road had been stopped by the order covering Grand Coulee Dam. The road is held essential in that it provides access to town for farmers who

would otherwise be isolated. This road extends south from Miles, Wash., for a distance of approximately 14 miles. A cost limitation of \$366,000 was placed on the project.

At the same time WPB partially relaxed restriction on the Blackfeet, Montana, irrigation project, to permit construction of a canal and headgate to replace the former canal system near Cut Bank, Mont., and rehabilitation of 7 miles of canal. This project had been halted as of December 16, 1942.

Heltzel

BINS FOR STORING, HANDLING OR BATCHING MATERIALS . . .

Have been placed under government regulations in order to help win the war. Our entire production has been earmarked for vital war effort construction.

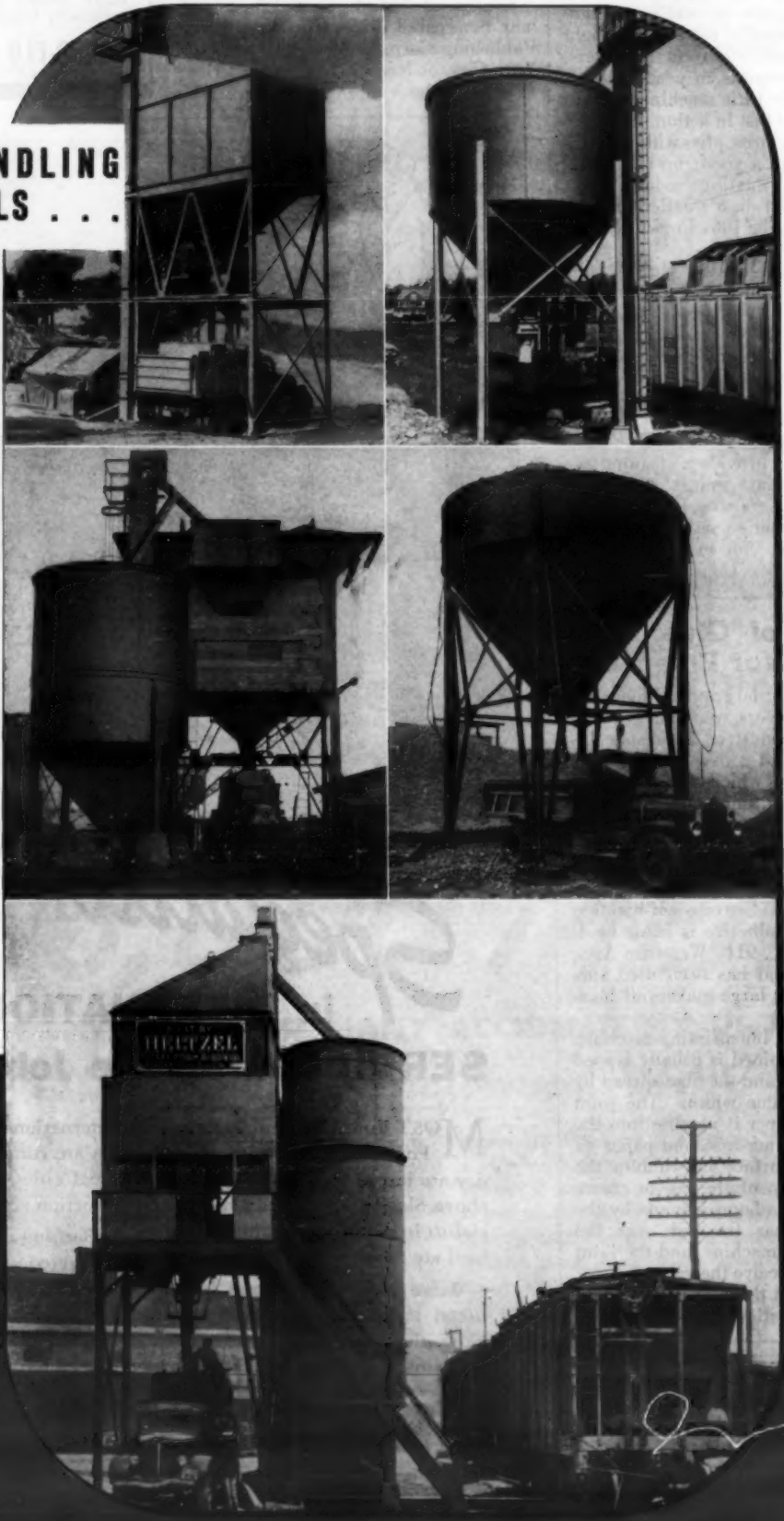
If your operations are vital to our Victory Program we are in a particularly favorable position to serve you . . . to help speed up your material handling operations.

Complete information is available on Truck Loading Bins and Circular Storage Bins from 35 to 300 tons for sand or gravel . . . Portable Aggregate Batching Bins from 35 to 100 tons capacity for batch truck or truck mixer charging . . . Portable and Semi-Portable Bulk Cement Batching Bins from 100 to 750 bbls. capacity . . . Permanent Aggregate or Combination Aggregate and Cement Batching Plants from 100 to 400 tons capacity with batchers up to 5 cubic yards . . . Cement Tanks for storing, batching or re-handling systems from 300 to 1500 bbls. capacity.

. . . INVESTIGATE !

HELTZEL SUPERIOR CONCRETE CONSTRUCTION EQUIPMENT

MILITARY HIGHWAY FORMS
AIRPORT FORMS
CURB, CURB AND GUTTER OR
SIDEWALK FORMS
PORTABLE AGGREGATE BATCH-
ING BINS — 30 TO 100 TONS
CAPACITY
PORTABLE AND SEMI-PORTABLE
BULK CEMENT BATCHING BINS
FROM 100 TO 750 BBLs. CAP.
CENTRAL MIXING PLANTS
CEMENT TANKS TO 1500 BBLs.
TREMIE CHUTING
CONCRETE FLOOR HOPPERS
CONCRETE BUCKETS



HELTZEL STEEL FORM & IRON CO.
WARREN, OHIO • U. S. A.

New Ohio Structure Improves War Traffic

(Continued from page 11)

bituminous approaches, including sub-grade treatment, are as follows:

Insulation course, 2-inch	1,933 sq. yds.
Waterbound-macadam base course, 4-inch	1,395 tons
Waterbound-macadam base course, fine-aggregate	511 tons
Black coloring in medial strip	1,217.5 sq. yds.
Asphalt-concrete surface course	73 cu. yds.
Bituminous surface treatment, aggregate	34 tons
Bituminous surface treatment, seal	1,011 gals.
Bituminous prime coat	2,092 gals.
Bituminous surface treatment, bituminous material	2,427 gals.
Bituminous treatment, cover aggregate	89 tons
Concrete pavement, 6-inch, for drives	211.4 sq. yds.
Concrete pavement, 7½-inch, medial strip	1,881.2 sq. yds.
Concrete pavement, 8-inch	38,371.4 sq. yds.
Integral concrete curb, total	21,339 feet
Concrete curb and gutter, 34 to 30-inch	2,010 feet
Concrete approach slab, 9-inch	356.6 sq. yds.

The major items on structures of 20-foot span and under, which covers the culverts on this project, were:

Excavation, structure	177 cu. yds.
Excavation, channel	277 cu. yds.
Concrete, structures	56.4 cu. yds.
Waterproofing	4.7 sq. yds.
Reinforcing steel	3,941 lbs.
Concrete pipe, plain, 15-inch	153 feet
Concrete pipe, reinforced, 48-inch	122 feet

The major quantities in the main structure over the railroad tracks, were:

Excavation, structure, unclassified	1,280 cu. yds.
Concrete, superstructure	1,462 cu. yds.
Concrete, pier walls	1,189 cu. yds.
Concrete, footing	566 cu. yds.
Reinforcing steel	287,500 lbs.
Structural steel	313,000 lbs.
Iron plates, wrought iron	4,500 lbs.
Field painting of structural steel	317,500 lbs.
Premolded expansion-joint filler, ¾-inch	34 sq. ft.
Premolded expansion-joint filler, 1-inch	34 sq. ft.
Reinforced-concrete piles, 14-inch	9,580 feet

The quantities for the 77.4-foot rigid-frame concrete structure over Fifth Avenue were as follows:

Excavation, structure, unclassified	2,130 cu. yds.
Concrete, frame	1,080 cu. yds.
Concrete, wing walls	420 cu. yds.
Concrete, footings	435 cu. yds.
Waterproofing	491 sq. yds.
Reinforcing steel	165,660 lbs.
Premolded expansion-joint filler, ¾-inch	4 sq. ft.
Premolded expansion-joint filler, 1-inch	310 sq. ft.
Bridge railing, concrete	156.2 feet

Test Piles

In order to determine the bearing of the piles for the structure the contractor drove a Monotube 5JN14 pile, 14 inches in diameter at the top and 8 inches in the tip. This pile was driven, in order to secure the 30-ton required bearing, to a depth of 27½ feet below ground and 28½ feet below cut off. Monotube fluted-steel piling filled with concrete was used as the below-ground foundation for the main structure.

Personnel

The contract for the James Road grade crossing was awarded to Visintine & Co. of Columbus, Ohio, for whom J. Visintine was Superintendent. The contract was awarded in December, 1942, for completion before December 31, 1943. The work was done under the plans and specifications of the Ohio Department of Highways, Hal G. Sours, Director, with Charles Hurlbut as Project Engineer.

Portable Hoppers For Concreting Jobs

With time one of the most important factors in winning the war, any machine or device which saves time is of interest to contractors and engineers today. The Butler portable concrete hopper for concrete construction jobs keeps truck mixers on the move by eliminating the waits while the concrete is delivered to buggies from the truck. Fewer truck mixers can deliver the same amount of concrete, without any idle time, the manufacturer points out, and on the job the concrete buggies make their deliveries more uniformly, with no men standing around waiting for the next truck.

Available in 2, 3 and 5-yard sizes, the Butler hopper is 10 feet wide at the top to eliminate the need for careful truck spotting, and low overall height allows any high-discharge truck mixer to load it without a ramp. The dual jam-proof

radial gates can serve two buggies simultaneously. It is equipped with two steel wheels, and is more stable and more maneuverable than the former three-wheeled design. The unit can travel at trailer speeds over the highway. If desired, the hopper can be equipped with steel skids instead of wheels. One man can easily erect it with an ordinary automobile jack, it is stated.

Further information on the Butler portable concrete hopper may be secured direct from the Butler Bin Co., Waukesha, Wis., by referring to this item.

Bridge Types Studied

Another in the series of bulletins resulting from a cooperative investigation of bridge types by the Public Roads Administration and the Texas Engineering Experiment Station of the Agricultural and Mechanical College of Texas has recently been issued. Entitled "The Solution of Two-Span Continuous Beams Under Live Loads by Use of Nomographs", this new bulletin is really a

sequel to the second bulletin "Two-Span Continuous Beams With Dead Load".

Copies of this new bulletin as well as Nos. 57 and 58, the two preceding bulle-

tins, may be secured by those interested direct from the Texas Engineering Experiment Station, School of Engineering, College Station, Texas.

SAVE MORE THAN 10%

...in both **STEEL** and **MANPOWER**

The WPA has recognized the possibilities of 10% savings in structural steel through welded design. In fact, National Emergency Specifications require that buildings be designed to secure greatest savings in steel possible through welded fabrication. On the job, Hobart Welders save at least 10% in manpower through simplified operation and advanced design. Get Hobart to work for you NOW.

HOBART BROTHERS CO.
Box CE-33, TROY, OHIO

HOBART Simplified ARC WELDERS

FREE Folder on National Emergency and Structural Steel for Buildings... Reference Posters.

a jungle gets a "Shave"!



Baker Hydraulic Bulldozers Do the "Barbering"

Contractors and road builders who have piloted Bakers through piney woods and forests would get a kick out of the way cat-skinners in uniform are using them to clear patches of jungles that are as tangled as spaghetti, sloshing through mangrove swamps that were yesterday thought impenetrable.

When the peace treaties are signed and the big post-war rebuilding job gets underway, ask the vets who saw the amazing job Bakers did—ask the boys who ran them what they think of direct hydraulic lift and full down pressure on the blade—of Baker's fast, positive action and ease of maintenance. Then, you'll want Bakers, too!

THE BAKER MFG. CO.

"If it concerns Victory, it concerns us"

585 Stanford Avenue
Springfield, Illinois

News from "Down Under"

War Correspondent: "This isn't like the Spanish-American War, is it?"

Army Engineer: "Hell, no! Malaria, typhoid and dengue were our worst enemies then, I believe."

W.C.: "This war seems more than a matter of fighters and guns. I notice a lot of construction machinery in use in this neck of the woods."

A.E.: "Yes, this war tops all others when it comes to the use of equipment such as you see along highways and around building projects all over the States in peace-time. Take those bulldozers over there—it'd be tough goin' without those babies—not only here, but on all our fronts."

W.C.: "I suppose it would be a tough job carving landing fields and roads out of that dense tropical growth without those rigs?"

A.E.: "Tough job? It would be practically impossible! You see, those dozers bowl over trees, tear out matted bougainvillea, grub out roots that would quickly start growing again if you didn't eradicate them, fill up the holes that are left and level smooth as a pool table, ready for surfacing—do it single-handed."

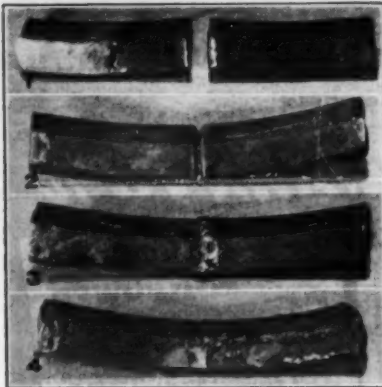
W.C.: "How do the Nips do it?"

A.E.: "Mainly with 'rice burners,' using picks and shovels. These bulldozers are our ace in the hole. When Nip captives see how we do it, they lose their superiority complex, but pronto."

(Based on a news story, "Yank Engineers 'Lift' Faces of South Sea Isles," by E. R. Noderer, Chicago Tribune ace war correspondent.)

BAKER

The Modern Tractor Equipment Line
for
EARTH MOVING
LEVELING AND GRADE BUILDING
SNOW REMOVAL
ROAD MAINTENANCE



New subgrader teeth from old. 1. These teeth are only 6 inches long. 2. In making new teeth, the ends are ground to form a double V where teeth are placed together. Here one side of the V has been filled in with coated mild-steel electrodes. 3. The two teeth have now been welded together to form one 12-inch tooth. 4. The wearing end has been coated with Stoodite and the tooth is now ready for action.

Replacement Problem Is Solved by Welding

When you have a couple of sets of worn parts and cannot buy any more, sometimes it is possible to make a replacement set that works as well as a new one, simply by welding. A typical example has come to us from Kansas, where a highway contractor was faced with a serious problem in the replacement of cutting teeth on his power subgraders used to cut the grade ahead of the pavers.

Each of these subgrade machines is equipped with 220 teeth bolted to a cylinder 18 inches in diameter and 12 feet

long. Since the teeth constantly come in contact with the earth, sand and stone in the subgrade, they wear down quite rapidly. The manufacturer designed a machine so that the teeth could be moved out as the ends wore away, but with the constant use of the machines on job after job it did not take very long to wear a 12-inch tooth down to 6 inches, the limit of permissible wear.

Only a few weeks ago when the time arrived to change teeth, the contractor discovered that he could buy no replacements, at least he could get no promise of an early delivery, because these teeth are made of an alloy steel that now finds its way into war equipment.

Naturally the contractor was unwilling to shut down his job so, with the usual ingenuity found in every contracting organization, he dug up two sets of worn teeth from the scrap pile and had them welded together. Realizing that even a good supply of worn teeth wouldn't hold out indefinitely since two sets of worn teeth were required to make one good set, he also had the welder hard-face the ends of the teeth with 3/16-inch coated Stoodite.

The worn-down teeth, only 6 inches long, were ground at the end to form a double V when two worn teeth were placed together. The V was then filled in with coated mild-steel electrodes to form one 12-inch tooth. The excess bead was ground off and then the business end hard-faced. When the salvaged teeth were put to the test, it was found that they lasted even longer than the new ones. Since a new tooth costs \$2.00 and the cost of the reclaiming operation was only 50 cents, the contractor is still wondering why he didn't think of welding the stubbed ends together before.



Light Weight
Self Starting
Gasoline or Diesel Power
Automatic Controls
Economical Engine Speed
Compact Dimensions

Make it 24 hours a day—in Death Valley or a sub-zero spot in Canada. . . . If it's a Schramm Compressor you can bank on uninterrupted delivery of rated capacity right around the clock in weather that may even knock your crews out.

Because these compressors are 100% water-cooled their performance is unaffected by outside temperatures—no sticking, no overheating, and correct lubrication at all times. Schramm's straight-lined design saves much critical material and, without sacrificing either power or stamina, they weigh as much as 40% less than others of equal capacity.

SCHRAMM
INCORPORATED

The Compressor People

WEST CHESTER, PENNA.

New Boric-Acid Fuse For Use Outdoors

For outdoor power systems a new weather-protected intermediate-duty boric-acid fuse which interrupts the circuit to faulted equipment and isolates the fault from the feeders with a complete 180-degree air break has been announced by the Westinghouse Electric & Mfg. Co.

In this new DBA-1 fuse, the blown fuse unit is dropped out of the circuit after the fault current is interrupted. Thus there is no possibility of burning contacts or arcing between the fuse tube and clips, or of any carbonized fuse parts breaking down to produce leakage or a second fault. Other features are the de-ion boric-acid arc quenching action and the sleet-proof ejector mechanism for all-weather operation. This fuse is available in voltage ratings from 7.5 kv through 69 kv and is applicable in utility and industrial high-voltage power systems for protecting power transformers, feeder-circuit sectionalizing, distri-

bution transformers, high voltage capacitors, and potential transformers.

Further information on this new DBA-1 power fuse may be secured direct from Dept. 7-N-20, Westinghouse Electric & Mfg. Co., East Pittsburgh, Penna.

Absorptive Form Liner Described in Bulletin

Fir-Tex absorptive form liner, developed by Fir-Tex engineers in cooperation with the U. S. Bureau of Reclamation, is described and its uses discussed in a bulletin issued by Fir-Tex, 1108 Porter Bldg., Portland, Ore. This form liner is made of felted wood fibers, specially treated to add to its absorptive properties and to prevent its bonding with concrete, and produces a smooth hard surface on concrete, eliminating pits, the producer states. The bulletin includes application instructions.

Copies of the bulletin, AIA File 37, may be secured direct from the manufacturer by mentioning CONTRACTORS AND ENGINEERS MONTHLY.



Carver Model 3651 (15,000 GPH) unwatering an excavation in Florida.

JOB records show that Carver Certified Pumps stymie the wear and tear of Time . . . keep their original lightning-fast prime, their original high efficiency even after hundreds of extra hours of service. On the really tough jobs where the water's full of mud or abrasive sand or grit, these rugged Carvers make an even better showing, for they're designed and built to handle the toughest jobs with easy-job economy.

Before you buy a pump, check the facts on Carver performance . . . you'll be hours and dollars ahead! See your dealer, or write us direct for complete information on Carver gas engine, electric motor or belt driven pumps from 3,000 to 125,000 GPH.

THE CARVER PUMP CO.,
Muscatine, Iowa

CARVER CENTRIFUGAL
Certified PUMPS



Road Maintenance In New Hampshire

Surface Treatments Are Needed Annually to Keep Roads in Prime Condition; 1943 Changes in Methods

(Photos on page 64)

YANKEE ingenuity is a byword in New England and elsewhere. Today, more than ever, it is called upon to effect savings in costs of operating a state highway department. The famous "Freezing Order" of April 24, 1942, which greatly reduced the availability of bituminous material for maintenance operations, resulted in a number of changes in bituminous surface-treatment methods. However, Commissioner Frederic E. Everett and the members of the Maintenance Department of the New Hampshire State Highway Department under LeRoy F. Johnson had devised economical treatment methods that resurfaced and revived 12 to 15 miles of 20-foot roadway a day with one outfit between 7:00 a.m. and 7:00 p.m., and now have improved upon that to meet further stringent curtailments because of the war.

Former Tar Maintenance

Most of the roads of the New Hampshire trunk-line system were of gravel or waterbound macadam which have been treated annually with about 1,400,000 gallons of tar, while 2,700,000 gallons of tar have been used on state-aid roads. The trunk-line system comprises 1,423 miles and the state-aid system 2,155 miles, making a total of 3,578 miles of state highway which must be maintained the year round, 3,000 miles of which are plowed during the winter. Between 60 and 70 per cent of the total mileage is surface-treated each year.

An annual contract is awarded for the tar necessary for this maintenance operation while the sand or fine gravel required is secured by force account. The typical operation described first in this article was observed in Division 8 with F. F. Hargraves, Division Engineer, Manchester, N.H., and was standard practice during 1941 and 1942.

The tar contractor as well as the various Division Engineers are supplied with a schedule of tank-car deliveries, showing the railroad station to which a tank car is to be delivered, the grade of tar, capacity of the tank car, and the date of arrival. The Division Engineer then plans his organization to move from place to place, apply this tar with the sand, and complete all operations from that locality as promptly as possible so as to move on to the next location on the day specified.

A unit organization capable of tarring up to 15 miles of road and processing it under traffic in one 12-hour day in Division 8 was as follows: two 1,500-gallon and two 1,200-gallon Kinney pressure distributors supplied by the tar contractor, twenty-two dump trucks



C. & E. M. Photo

Loading a 1,500-gallon Kinney tar distributor for bituminous surface treatment in District 8, New Hampshire State Highway Department, in 1942.

hired locally, two shovels (one 5/8 and one 1/2-yard shovel in this case), two small power graders, four Burch Under-Truk hydraulically controlled hones, one Huntley rake, and two single-wheel rollers. With this outfit under the control of the division patrol organization were 28 laborers working on the trucks

to deliver the sand to the spreader devices, working in the gravel pits, and as truck drivers.

State specification T-5 tar with a specific viscosity of 20 at 50 degrees C was applied at the rate of 0.2 gallon per square yard by the American Tar

(Continued on page 52)

"The SEAMAN PULVI MIXER gives the contractor greater uniformity and thoroughness of mix and cuts costs 40% - 50%"

MR. O. F. BARNETT of the Barnett Machinery Company, Lake Dallas, Texas.



Barnett Machinery Company
Box, Phone 43 • LAKE DALLAS, TEXAS • Res. Phone Taylor 4560

March 24, 1943

Seaman Motors
305 N. 26th Street
Milwaukee, Wisconsin

Gentlemen:

We have had the opportunity on a number of occasions to check the work of the SEAMAN PULVI-MIXER in soil stabilization construction in this area.

The economy obtained by the SEAMAN is outstanding in comparison with the costs that prevailed before the PULVI-MIXER was introduced. I would say that, in most operations, the SEAMAN has cut from 40% to 50%.

In soil-cement construction, the SEAMAN PULVI-MIXER gives the contractor much closer control of mixture, a greater uniformity and thoroughness of mix through the full depth of treatment. This also applies to the control of water-application in soil-cement stabilization. Water migration and consequent soft spots are entirely eliminated, for with the PULVI-MIXER, a thorough mixture can be obtained as rapidly as moisture is applied.

Further SEAMAN PULVI-MIXERS will harvest approximately 50% more Bermuda grass per acre than other methods known to us and will reduce the cost in harvesting Bermuda grass approximately 75%.

Yours very truly

BARNETT MACHINERY COMPANY

By-

O. F. Barnett

SEAMAN MIXERS & PULVERIZERS
Cement, Sand, Clay, Aggregate and other Stabilizing Materials

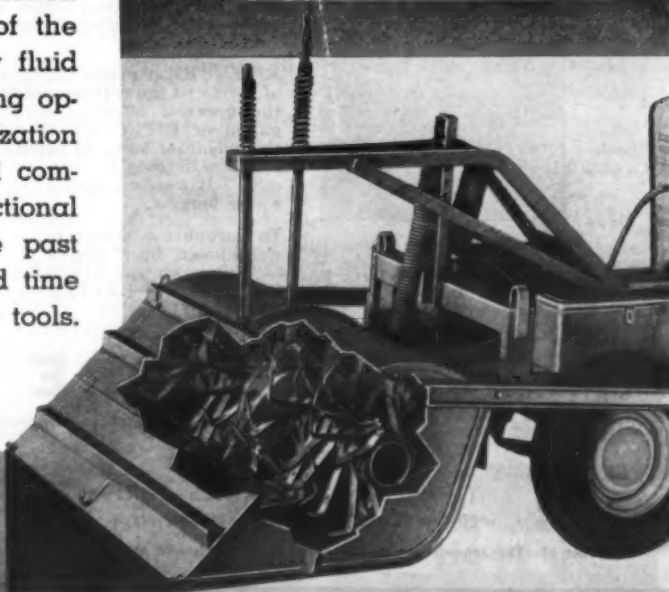
The State of Texas has been the scene of a great many large soil-cement stabilization jobs,—and Mr. Barnett's observations of the economy and quality of the work of the SEAMAN MIXER, carry authority.

What Mr. Barnett says of the elimination of water migration by the use of the SEAMAN applies equally to any fluid binder. And in all in-place mixing operations in the various soil stabilization processes, the SEAMAN MIXER combines in one operation the functional processes which have in the past required laborious, uncertain and time consuming work with soil tillage tools.

For all in-place mixing operations
... it's the SEAMAN!

SEAMAN MOTORS
Manufacturers of the SEAMAN MIXER
AND THE SEAMAN PULVI-MILL
MILWAUKEE, WISCONSIN

Cutaway view of the mixing chamber showing the arrangement of the tines. SEAMAN MIXER MHD 72. (Motorized)



INSURE
PROPER CONCRETE
CURING

with

WILLIAMS
SUB-GRADE
PAPER

Write us for
information on other
Papers meeting
Federal Specifications
particularly UUP-536

WILLIAMS
ROOFING PRODUCTS CO.
North Kansas City, Mo.

Training of Seabees For Active Service

(Continued from page 13)

Lubrication and tire repair, 30 periods for lubrication and 6 additional periods for four men only from each class on tire maintenance; Gas-engine and mobile equipment, 30 one-day periods; Piping and heaters, 30 periods; Stills and purifiers, 33 periods; Welding, 30 periods; Stationary gas and diesel-engine servicing, 30 one-day periods; Refrigeration, 35 periods; Radio and communication, 22 periods; Electricity and generators, 20 periods; Pontoons, 27 periods; Seamanship, 30 periods; Wharf and dock work, 15 periods; Tanks and masts, 30 periods; Power-shovel operation, 6 classroom periods and sufficient operation to qualify the man; Bulldozer operation, 5 periods with sufficient operation to qualify; Crane operation, 6 periods with sufficient operation to qualify; Road-machinery operation, 5 periods with sufficient operation to qualify; Rigging and ship stowage, 21 periods; Laundry operation, 14 periods; Rigging and splicing, 21 periods.

It will be noted that the length of time given to training the group of men selected for any particular school varies in length, according to the amount of skill required. These training periods are reduced, however, when men have sufficient skill based on past experience.

Military Training

Military training includes Judo; the usual close-order formations; manual of arms; extended order and combat for-



Official U. S. Navy Photo

Field training at the Earth-Moving School with a D7 tractor and LeTourneau scraper.

mations; dry firing; work on the range with subcaliber and service charges, with the Springfield rifle, carbines, automatic rifles, submachine guns, machine guns, and anti-aircraft guns; bayonet drills; hand-grenade drills; first aid; and conditioning work on the Commando run. This last is a course 1/2 mile in length with innumerable obstacles simulating practically every condition under which a man would be called upon to carry on in either attack or defense. At the completion of the formation of a battalion with its full complement of skilled technical men trained in the use of arms, the battalion has its final review, receives its colors, and takes up its billet in the advanced training area separated from the general camp area to await its service orders.

The Instruction Staff

There are eight Commissioned Officers in the technical training staff, who are responsible for maintaining discipline in the various technical training schools and for the work of the instructors, as well as for acquiring and replacing ex-

are First Class Petty Officers. The classes consist of twelve men each.

Each course starts with an introductory discussion of its objectives and many of them with specially selected motion-picture films from the library of over 300 films, showing features of the equipment to be studied and its operation. Many of these films were prepared especially for the Seabees, while others are from the libraries of manufacturers of the various types of equipment studied. Each session of a class ends with questions by the instructor and by the class, so as to check on the men to see if they have grasped the work done at that particular session, and giving the men an opportunity to clarify their understanding of the work.

We have selected a few of the Schools for description to show the quality and extent of the training received by the enlisted men.

The Diving School

The Diving School joins knowledge (Continued on next page)

Cleanliness CUTS CASUALTIES

Our armed forces everywhere are also fighting dirt and disease—frequently more dangerous than bullets. Mobile laundry units are provided, with small gasoline engines as a part of the power equipment. One more "service star" for rugged, dependable Briggs & Stratton engines, now serving our armed forces in many ways.

ONCE again we want to urge every one here back home who owns or operates Briggs & Stratton 4-cycle, air-cooled gasoline engines, to do everything possible to keep them at top efficiency. Not only will extra service be gained, but the critical materials that would be needed in unnecessary repairs will be saved.

Whether these engines are on farms, in industrial plants, on construction or road jobs, or in army camps—they are all doing their part in the war program — and deserve extra care right now.

Keep your Briggs & Stratton gasoline engines clean, properly adjusted, well lubricated, and in repair. Your nearest dealer or Briggs & Stratton Service Station will be glad to help you.

BRIGGS & STRATTON CORP.
MILWAUKEE, WIS., U. S. A.

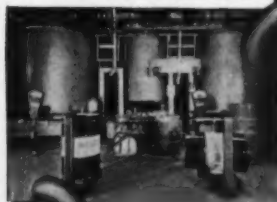
ENLIST YOUR DOLLARS
Invest in
WAR BONDS

BRIGGS & STRATTON
GASOLINE
ENGINES

RITECURE

THE BETTER MEMBRANEOUS
CONCRETE CURING MATERIAL

2 Modern Manufacturing Facilities



1 Strict Laboratory Control



No Weak Link in this Chain

RITECURE isn't a patent medicine thrown together in some dark corner by pseudo-chemists using "rule-of-thumb" methods and with no pretense of consistent proportioning.

No! RITECURE is a uniform product made up of certain standard ingredients in fixed proportions and manufactured under strict chemical and physical control. And, since it contains no strategic materials, it can be and is being produced in quantities ample enough to make large shipments promptly to any construction job.

RITECURE provides the greatest ratio of solids to the solvent—hence provides the greatest effective coverage. One gallon of RITECURE is sufficient for the curing of 30 to 40 square yards... and it will cure it properly. It retains curing water longest.

To paraphrase a certain well-known beer slogan—"Make yours RITECURE"—for BETTER CONCRETE.



Send for this
Bulletin



RITECURE

A Transparent Membrane for Curing Concrete

IS SOLD BY

THOMPSON MATERIALS CORP.
204 WEST STREET, NEW YORK, N. Y.

a product of: The Johnson-March Corporation, 52 Vanderbilt Avenue, New York, N. Y.

5-218-0

Construction Units Get Varied Training

(Continued from preceding page)

of underwater operations with technical skills learned in other schools. In this school, each man must have 10 hours of underwater experience, for which he is equipped with a diving helmet, a complete diving suit, or a living mask. Air for each of these pieces of diving equipment is furnished by an air compressor located outside of the building, with a safety man always on duty to insure a constant supply of air to the men in the tank. The diving tank is 55 feet in diameter and has 26 feet of water. The water is heated to about 70 degrees F, and the men work from 1 to 2 hours at a time. In this tank the men learn to assemble bulkheads underwater, to use a hammer and nails, saw, welding and pneumatic equipment, and other tools. Six men from each battalion must graduate from this school. The men also have classroom work in the making of knots.

Heavy-Equipment School

The Heavy-Equipment School, like the other schools, is housed in a building 40 x 100 feet in plan. The building walls and ceiling are in the form of a half cylinder of 20-foot radius. A line of windows down each side at about shoulder height furnishes excellent lighting for benches immediately below them and additional electric lights throughout the building provide ample illumination for all work. Each of the school buildings is also equipped with small classrooms, a tool room and an office, and each is heated by a separate coal stove.

The machines for study in the Heavy-Equipment School include: a 6-cylinder engine which is assembled and disassembled; an Allis-Chalmers HD-14 chassis, the rear end of which was scrapped from work in Iceland, and which was cleaned up and is now used for instruction purposes; a complete drive unit from a Warco grader; an Allis-Chalmers Model M tractor; an International TD-6 tractor with a Bucyrus-Erie bulldozer which is used as a sample for all sizes of International tractors; a Caterpillar D6 tractor which serves for instruction in the D6 and D7 sizes, while the D8 is somewhat different so it is

covered by a separate unit.

A bench alongside each piece of equipment provides a handy place to lay tools and parts. Each piece of equipment is broken down completely so that no two pieces are together and then must be assembled in the proper manner for operation. Four men work as a unit in this assembly and break-down as there is not room for more without their getting in each other's way. There may be as many as 12 men working around a single piece of equipment at one time, but each group is working on a separate and distinct job. After they have become fully familiar with that particular piece of work, they are shifted to another part of the same machine.

This school, located in Building T8, also repairs equipment and, in connection with Building T10, which is the regular repair shop, handles all repairs on equipment as a part of its advanced training.

In Building T10, at the time of our visit, a Northwest 25 crane was being overhauled and a Trackson pipe-layer

mounted on a Caterpillar D7 tractor was in for repair; while in another section of the shop a Galion grader was being overhauled. If the men in T8 are studying a certain piece of equipment or engine in their work and one of these comes in for repair, they work on it in T10. While all welding instruction is given at the Welding School, the men from the school go to T10 to do extra work on repairs.

Lubrication and Tire School

The floors of all of the schools are 4 inches of concrete roughened sufficiently to prevent their ever becoming slippery. At the Lubrication School, where a large pit is built in the center of the building so that heavy equipment may be run over it for lubrication, the concrete around the pit is 12 inches thick instead of the usual 4 inches. This building, T9, also has a large wash rack and two doors at the front, one permitting entrance at the center and the second to the wash rack. This school is equipped with a Brunner garage air compressor driven by 1/4-hp

Wagner electric motor to furnish air for inflating tires and operating a large tire spreader.

In addition to the complete lubrication facilities in this shop, a mobile greasing unit is maintained to look after all equipment operating throughout the camp. The unit consists of a Chevrolet stake truck with a tarpaulin top, and an Ingersoll-Rand skid-type compressor powered by a Wisconsin gasoline motor mounted immediately behind the cab with air


(Continued on page 44)

C.H.&E. CONSTRUCTION EQUIPMENT

Portable Saw Rigs


Three Models—2 to 15 horsepower, for ripping up to six inch lumber. All welded steel construction, ball and roller bearings, swinging arbor, V belt drive, Band Saw, jointer attachments. For out on the job or in the shop work. Write for Bulletin. 3810 N. Palmer St.

C. H. & E. Manufacturing Co.
Milwaukee, Wis.



Opening the way to Victory!

with GW Road Machinery



MAINTENANCE of your present equipment IS IMPORTANT



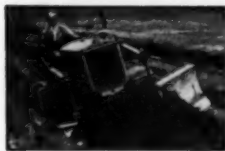
SYNTRON

ELECTRIC HAMMERS

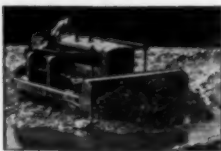
provide a money, time and labor-saving way of cleaning old, hard cement from mixers, chutes, etc. Also for scaling rust and paint from metal surfaces.

Write for your copy of Catalog No. 430.

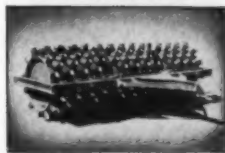
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GW Roadbuilders



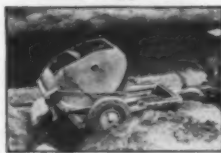
GW Bulldozers



GW Tamping Rollers



GW Rippers



GW 2-wheel Scrapers
backfilling around culvert

Write for literature.

Protect Freedom
**BUY
WAR BONDS**
for Victory!

GW Road Machinery is playing a highly important role in the winning of our Global War. The mechanized forces of the United Nations rely upon GW Scrapers, Bulldozers, Roadbuilders, Rippers and Tamping Rollers to clear the Way to Victory! Powerful, hydraulically-operated GW War Scrapers slice out chunks of hills, mountains, dig and haul, dump and spread all kinds of terrain, making it possible for faster building of roads, airfields, dams, and other projects, for quick, offensive advancement.

GW Scrapers have the capacity to move tremendous quantities of dirt in a short time by reason of their unique design, hydraulic action and rugged construction. Only GW Scrapers have all these exclusive features: Spring-Lift for Lifting Load Rapidly When Needed—Integral Pump-Tank-Valve Assembly—Positive Gravity Ejection of Load—Variable Cutting Edge Angle—Power Return for Bowl and Gate—Power Down on Blade—Variable Wheelbase.

See your nearest Allis-Chalmers Dealer.

OUR ONLY JOB NOW IS TO WIN THE WAR

ROAD MACHINERY DIVISION

GAR WOOD INDUSTRIES, Inc., Detroit

Concrete Reservoir Built at Army Depot

(Continued from page 18)

at the center of the end and flow toward the corners and around to the sides the cranes were slowly moved down the sides, maintaining a height of concrete toward the end first poured. On reaching the far end the booms were swung around and finally the concrete rose at the center of that end, completing the pour. The use of the fleet of truck mixers was good insurance for the success of the pour as, if one unit had broken down, it would only have slowed up the pouring, or it could soon have been replaced by another unit during the pour. If reliance had been placed on a single mixer, a breakdown would have been disastrous.

The concrete crew for pouring the walls was made up of two crane operators with two oilers, two ground bucket men and two top bucket men, five men spading, and eight men tamping on the inside and six men on the outside.

Pouring the Floor

The 7-inch structural floor was poured after the walls and the 1-inch finish floor was poured before the initial set. The structural floor was poured in twelve squares with copper and mastic joints. The concrete was handled by one crane and a side-dump Insley bucket which emptied into a buggy hopper set on the floor. From the buggy hopper platforms were set up consisting of 4 x 4-inch legs 15 inches long and with 1 x 6-inch braces to carry the runways for the buggies. The runways were 1 3/4 x 12-inch planks 3 feet 6 inches long with a 1-inch space between and nailed to the platform stringers. These made smooth running for the steel wheel buggies. In the concrete crew a hopper man replaced the top bucket man, then there was a hopper-gate man, two buggy wheelers, and four spreaders. On the finish surface course only one buggy was used with two spreaders and six finishers.

Interior Columns and Roof Slab

The six 18-inch square interior columns were poured half height through 1 x 2-foot pour holes, using the same small plywood tubes or chutes as were used for the walls. One Insley side-dump bucket on a crane was used for this work. All of the interior columns but one could be reached by the crane and that one column had to be poured by pails. The columns were poured before the walls were formed.

The roof-slab forms were shored up 21 feet from the floor and then the concrete poured with the crane, bottom-dump bucket, hopper, and buggies.

Personnel

The contract for the construction of the emergency reservoir and a 12-inch well 82 feet deep, with the necessary changes in the existing pump station, was awarded and supervised by the U. S. Army Engineer Corps.

In the interest of national security, the location of and mention of personnel connected with U. S. Army construction are omitted.

A New Floor Cleaner For Shops and Garages

A new floor cleaning compound, for use in garages, shops, hangars or other buildings where machinery is serviced and oil or grease may collect or be spilled on the floor, has been announced by the Lacey-Webber Co., Kalamazoo, Mich. Known as Fibre-Tex, this new compound is said by its manufacturer to eliminate the danger of fire inherent in the use of many types of cleaners. It

is stated that Fibre-Tex will not burn when the flame of a blow torch is played directly on it, nor as the result of spontaneous combustion.

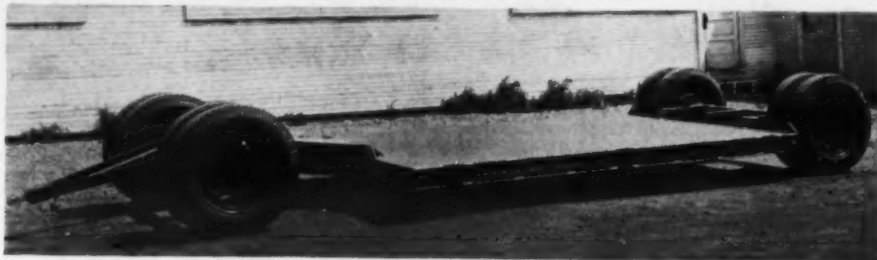
It is also stated that Fibre-Tex is highly absorbent of oils and grease and has an active cleaning effect upon floors on which it is constantly applied. Grease

and oil-caked dirt are readily removed, and floor markings made plainer. Fibre-Tex is packaged in 50-pound cartons and is distributed through automotive, hardware and similar distributors.

Further information on Fibre-Tex and the name of the nearest jobbers may be secured by interested contractors and

state and county highway departments direct from the manufacturer. Just mention this item.

Your idle equipment is working for the enemy. If you haven't any use for it, be sure that it gets in the hands of some one who has!



MARTIN TRAILER

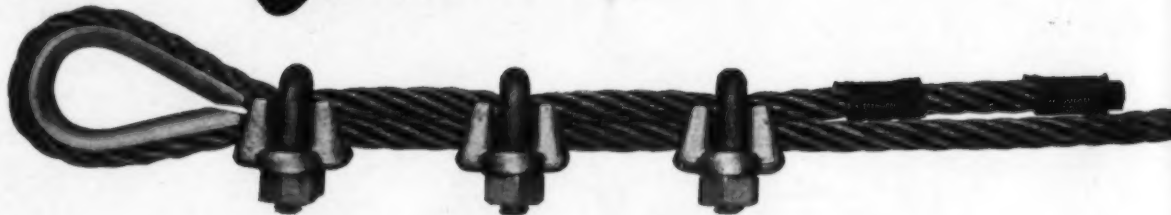
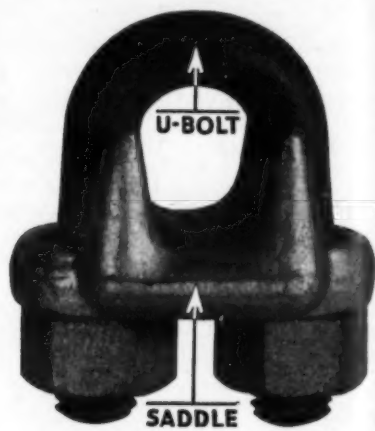
—4 models—

7, 10, 15 & 18 1/2-ton capacities

Don't say, "We want a TRAILER." Say: "We want a MARTIN Trailer."—This will insure your getting a trailer that's EASY LOADING, POWERFUL, FAST, SAFE, LONG-WEARING and ECONOMICAL. . . .
Sold by all Caterpillar Distributors. WRITE FOR BOOKLET

Martin Machine Company, Kewanee, Ill.

**BE CAREFUL
WITH THOSE
CLIPS**



The efficiency of a clipped attachment depends largely upon how the clips are fastened in place. U-bolts should always bear against the short end of the wire rope. The saddles should bear against the load, or "live" side of the rope. Distance between clips, center to center, should be not less than six times the diameter of the wire rope. In applying clips, tighten all bolts uniformly before and after the rope is under tension. Then, after the rope has been in service for several hours, tighten the clips again.

Although the proper fastening of clips, as explained above, is as simple as a, b, c, operators in the field still find that clips are often used incorrectly. Now that all wire-rope users are trying in every way to reduce time-out for replacements and to get utmost service from wire rope, proper use of clips is more important than ever. The

table below is an established guide to the right way to use clips:

Rope diameter	Minimum number of clips	Spacing between clips
1/4"	2	2"
3/8"	2	2 1/2"
1/2"	3	3"
5/8"	3	3 3/4"
3/4"	4	4 1/2"
7/8"	4	5 1/4"
1"	5	6"
1 1/8"	5	6 3/4"
1 1/4"	5	7 1/2"
1 3/8"	6	8 1/4"
1 1/2"	6	9"
1 5/8"	6	10"
1 3/4"	7	10 1/2"
1 7/8"	7	11"
2"	8	12"

For drop-forged steel clips and for Purple Strand Ropes or lower qualities of rope.

The following percentages show how the efficiency of an attachment is reduced by the improper use of clips:

Clips fastened alternately on opposite sides 75%
U-bolts bearing against load side of rope 70%
Nuts tightened improperly . . . 50% or less
Rope knotted, then clipped . . . 50% or less

Thimbles should always be used as a support inside a rope "eye," regardless of whether the rope is clipped or spliced. If this is not done, the load will flatten the rope out of shape, kink or dog-leg it, and much of the rope's service life and efficiency will be sacrificed.

Bethlehem makes a complete line of wire rope for all purposes and our distributors are in key locations all over the United States. Contractors moving into new territories to handle war jobs can always count on Bethlehem Wire Rope, and the helpful service of experienced distributors.

Bethlehem Manufactures Wire Rope for all Purposes

BETHLEHEM STEEL COMPANY





The new Model HN power-control unit developed jointly by LeTourneau and Willamette Hyster.

Power-Control Unit With Towing Winch

A new combination power-control unit and towing winch has been developed, making possible the combination installation of a bulldozer and towing winch on the same Caterpillar D4 or R4 tractor. This new Model HN power-control unit, developed specially for the Combat Engineers, combines a LeTourneau single-drum power-control unit for bulldozer operation with a Hyster D4 towing winch. This unit is unique in that it marks initial collaboration between the Willamette Hyster Co., Portland, Ore., and R. G. LeTourneau, Inc., Peoria, Ill.

Both the Hyster winch and the power-control unit are standard job-proved models combined here into one compact unit. They may be operated independently or together. The LeTourneau drum has a speed of 308 feet per minute on the bare drum, while the Hyster winch has a line pull of 15,400 pounds and its line speed is 91 feet per minute on the bare drum.

While built for military use, the HN unit has very obvious advantages for loggers, contractors, utilities and other tractor users who have need for a bulldozer plus a power winch. Like other Hyster and LeTourneau tractor equipment, the Model HN is sold through all Caterpillar dealers. Further information regarding this unit may be secured direct from either manufacturer by mentioning this item.

New 435-Hp Engine Is All-Purpose Unit

The latest addition to the line of Climax engines and engine-generator sets is the new V-12 Blue Streak engine recently announced by the Climax Engineering Co., Clinton, Iowa. With a normal speed range of 600 to 1,200 rpm and a brake horsepower of 435 or 375, the new V-12 is designed to meet today's needs for a high-speed engine for rock drilling equipment, operating large pumps and compressors, powering large heavy-duty construction equipment, and, with suitable generators, for providing electric power on the job.

Among the design and operating features of this new engine is its ability to deliver peak power on natural gas, butane, gasoline or other fuels. Change-over is quick and easy, with standard outside-located accessories. Economical fuel carburetion provides complete and uniform fuel distribution, it is stated, which results in full power and low consumption of the fuel used. Another feature is its dual ignition, as each cylinder has two spark plugs which provide a greater flame, increase power output and remove the possibility of ignition failure. If one plug should fail, the other will continue to operate. The specially shaped combustion chamber is designed for maximum turbulence to assure complete combustion. Its shape and the location of the spark plugs reduce the tendency

to detonate when sudden or sustained overloads are encountered. Widely spaced large-capacity cooling jackets cover the entire length of the stroke which, with the wide spacing of valves and the entrance of water where heat is greatest, provide cool running and long life.

The new Climax V-12 is available in two bores: Model V-335 has a 6½-inch bore and 7-inch stroke and develops 375 hp at 1,200 rpm; and Model V-390 has a 7 x 7-inch bore and stroke and develops 435 hp at 1,200 rpm. Dual ignition can be furnished in the following combinations: dual battery ignition; dual magneto ignition; or dual battery and magneto ignition. Where required, a complete range of accessory equipment, such as starting devices, air cleaners, filters, radiators, etc., are available and can be selected to meet the specific needs of a particular installation.

More complete information, including specifications, test data, and recommended applications, may be secured direct from the manufacturer.

ROBINS *changes its name!*

CONVEYING BELT COMPANY

... adopting a new one more truly descriptive of the scope, utility and applications of its products and services. This move does not involve any change in directorship, management or corporate structure.

ENGINEERS • MANUFACTURERS • ERECTORS

For Material Aid
in Materials
Handling

**ROBINS
CONVEYORS**
INCORPORATED

(ROBINS CONVEYING BELT CO.)

PASSAIC • NEW JERSEY

It's ROBINS

MATERIALS HANDLING MACHINERY



—Instantaneous Dumping Counts

Koehring Dumpsters have the war speed so vital for essential military projects. As in peace-time, Dumpsters are now hauling dirt and rock at high speed for the armed forces, here and overseas. Instantaneous dumping saves seconds, increases trips per hour, assures full loads every trip. All types of material are dumped clean every time. Remember the Dumpster and its many cost-cutting features, when they are again available for peace-time projects.

KOEHRING COMPANY
MILWAUKEE • WISCONSIN

Depend on your Koehring distributor to help you keep your equipment operating. Care for your Koehring equipment NOW, so it will serve you tomorrow. Koehring distributors have genuine Koehring parts. Koehring parts warehouses are at your service.



HEAVY-DUTY CONSTRUCTION EQUIPMENT

Regular Inspections Of County Equipment

(Continued from page 1)

Grease distributor cam with cam grease.
Check secondary wiring to distributor and condenser connections.
Check gas pump, clean bowl and spring.
Check water pump for leaks, etc.—hose connections.
Lubricate water pump. (Use pump grease only.)
Check fan belt for tension.
Check carburetor and choke. Free choke control.
Clean carburetor air cleaner.
Adjust carburetor to best idling speed.
Check all electrical connections back of instrument panel.
Check battery connections, hold-down bolts and hang-
er.
Check gravity cell 1. 2. 3.
Free up and tighten windshield adjustments.
Check radiator for leaks—water passage—hold-down
bolts.
Check spring leaves for broken ones.
Check front wheels for tire wear—align when necessary.
Check steering gear, tie rods, and spindle bolts.
Check hydraulic fluid.
Check brake linkage and brakes—adjust both when
necessary and centralize shoes. Grease cables.
Check all lights—dash—dome, etc.
Check gas and oil—tire inflation.
Check flares, flags, and forks.
Check spinner hitches.
Check snow plows.
Check transmission and differential grease.
Complete lubrication.

The Stock Room

The stock room, 30 x 33 feet, is at the east end of the repair garage, adjacent to the office of the Superintendent of Equipment and the Chief Garage Clerk. In the stock room are wooden bins for large parts and stock, and steel bins for bolts and small automobile and truck parts. Hand tools, such as picks, spades, long-handled shovels, etc., are neatly stored in racks off the floor. Gaskets are hung on the wall on a large board away from possible damage, while extra batteries are stored on a wooden rack. In the stock room is a portable motor tune-up stand and a Quick-Way portable valve-refacing unit. These two machines are stored in the stock room and are taken out whenever needed by the mechanics. The stock room and other parts of the garage where there is a gasoline hazard are protected by installations of C-O-Two fire extinguishers.

Parts and supplies are issued only on a requisition signed by the mechanic and are charged to the equipment being serviced. A mechanic is on duty six nights a week to service trucks which are busy in the field all day.

The Repair Garage

The repair garage is well lighted by eight large windows in the south wall, adequate overhead lighting, and many wall plugs for trouble lights and small power equipment. A large refrigerated drinking fountain is installed at the east end of the garage near the window to the stock room through which requisition materials are issued.

Separate benches are provided for the mechanics along the south wall of the garage with individual trays on casters for storing torn-down motors, transmissions, etc. A locked tool box and locked drawers are provided at each bench for storage of the personal tools of the mechanics. Each bench is also equipped

INSPECTION RECORD OF CARS AND TRUCKS									
PRON	DRIVER	CHANCE	LUB	CHECK	REMARKS	PRON	CHANCE	LUB	CHECK
1						1			
2						2			
3						3			
4						4			
5						5			
6						6			
7						7			
8						8			
9						9			
10						10			
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25						25			
26						26			
27						27			
28						28			
29						29			
30						30			

The Inspection Board, prominently displayed in the Franklin County repair garage, is a reminder and a record of inspection due each piece of equipment.

with a heavy vise.

Other bench equipment includes a Champion spark-plug cleaner and tester,

a Keystone Reamer & Tool Co. power buffer and grinder, and a Keystone portable 1/2-inch electric drill rigged as a

bench drill. Carefully spaced between the benches and at the west end of the garage are a Champion drill press, a Weaver mechanical press, a power hack saw set on the floor, and a pneumatic-oil lift for trucks.

The garage is equipped with an oil room having separate rectangular drums for each type of lubricant, an equipment washroom with a Hypressure Jenny to save time in cleaning parts, a Hobart portable electric welder and also a K-G acetylene welder and, in the northwest corner of the garage, a rack for recharging batteries with a G-E Tungar charger. A Brunner garage compressor furnishes air for all needs in the shops.

The Storage Garage

The storage garage is in a wing attached to the west end of the repair garage and is equipped with 4 overhead doors furnishing 12 x 12-foot clear openings. These open into a central paved court yard which is back of the

(Concluded on next page)

Do You Know . . .

- How to start and run your new drills?
- Why well-oiled drills cut much faster?
- Why worn chucks reduce blowing power?
- How to prevent freezing in cold weather?
- How to remove a scuff or a "pick-up"?
- How to heat-treat shanks and bits?
- What bad shanks do to pistons and chucks?
- How to figure your drilling costs?

This FREE Handbook
has the Answers! (and many more)



The DRILLER'S HANDBOOK contains:

156 Pages

118 Illustrations

11 Tables

Repair Cost Records

You need this book to get more work and longer service out of your air tools. Send now for your free, postpaid copy. When writing, please mention the sizes and types of rock drills you are now using.

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Chicago, Ill.	Knoxville, Tenn.	Pittsburgh, Pa.	Washington, D. C.

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Subsidiary of The Cleveland Pneumatic Tool Company

CABLE ADDRESS: "ROCKDRILL"

CLEVELAND, OHIO

LEADERS IN DRILLING EQUIPMENT

WON'T QUIT
or cause time out



A Hayward Bucket keeps the job going ahead on scheduled time. It won't quit or cause time out.

The Hayward Company
32-36 Dey Street
New York, N.Y.

Hayward Buckets

Well-Planned Garage In Franklin County

(Continued from preceding page)

repair garage. The latter has 3 similar doors, opening onto the court yard. The blacksmith shop is located in the southwest corner of the storage garage and is equipped with a forge, anvil, Baldor buffer and grinder, and a reasonable stock of tool steel.

Seasonally stored in this garage are the County's FWD truck with a Ross V-plow and a Burch under-body blade, a Fruehauf equipment trailer with a Mack truck-tractor for hauling the large tractors as well as the County's 1/2-yard Northwest shovel. Another interesting piece of equipment stored here is a general-purpose Fordson tractor equipped with solid rubber tires on large hollow steel wheels. This tractor is used for moving equipment about the yard and garage.

Just to the rear of the garage is the 62 x 68-foot paint shop which is equipped with an O & S band saw, a DeVilbiss paint spray gun, and an electric sander. A special heater for quickly drying paint on signs has been installed in this shop.

Equipment Roster

The selection of equipment for maintaining the 740.94 miles of county roads distributed over the 550 square miles of Franklin County has been done carefully in order to have an adequate amount of mechanized equipment and accessories to handle the work economically both summer and winter. Three 1,000-gallon asphalt tanks are installed in the districts farthest from the main receiving points for bituminous materials.

The following roster shows the major equipment used by Franklin County for highway and bridge maintenance:

- 1 Gallon 10-ton 3-wheel roller
- 1 Buffalo-Springfield 10-ton 3-wheel roller
- 1 Baker 6-ton 3-wheel roller
- 1 Gallon portable 4 to 6-ton single wheel roller with pneumatic tires
- 1 Fairbanks wheelbarrow scale
- 1 Dunkey 10-foot stone-chip spreader
- 1 Gallon 10-foot stone-chip spreader
- 2 Hy-Way sanders with Briggs & Stratton motors
- 1 Gallon spinner-type sanders
- 1 All-Purpose spinner-type sanders
- 1 Flank one-man sanders
- 1 LeTourneau bulldozer
- 1 Gallon motor grader
- 1 Caterpillar power grader
- 1 Gallon pulled graders
- 1 Concrete mixers, miscellaneous
- 10 Centaur mowers
- 1 National sicklebar mower with Briggs & Stratton motor
- 1 Jaeger 3-inch pump
- 1 Jaeger 2-inch pump
- 1 German-Rupp 1 1/2-inch pump
- 1 Euclid sheepfoot roller
- 1 Northwest 1/2-yard shovel
- 1 Cietze-Sargent overhead shovel
- 1 Mundy 3-drum steam hoist for bridge work
- 1 Littleford 310-gallon heating kettles
- 1 MacLeod 210-gallon heating kettles
- 1 Fordson tractors
- 2 Caterpillar Sixty tractors
- 1 Cleaver-Brooks steam car heater
- 1 Hobart portable electric welder
- 1 Master vibrator



Equipment repair and upkeep in the Franklin County repair garage. Trucks and other machines are maintained for continuous service.

- 1 Sullivan air compressor on a Ford Model-A truck
- 2 Baker one-way snow plows
- 4 Baker heavy-duty snow plows
- 6 Ross snow plows
- 1 Ross V-type snow plow

- 5 stone spreaders held in reserve
- 1 Hough Tu-Way road sweeper
- 1 Killefer cultivator for soil-cement work
- 1 Killefer disc harrow for soil-cement work
- 1 peg harrow for soil-cement work

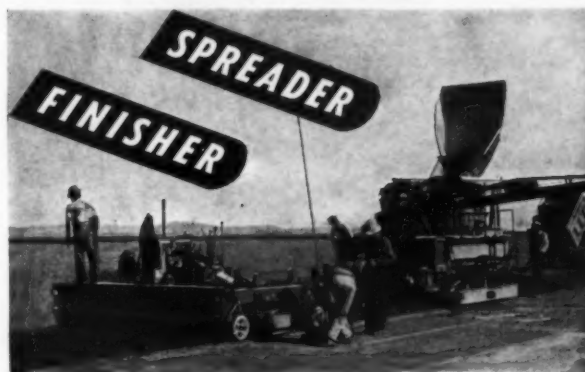
- 1 John Deere 3-bottom breaking plow for soil-cement work
- 1 Fairbanks-Morse 115-volt 750-watt generator for power for drilling holes in guard-rail posts
- 1 Master gas-electric generator
- 1 Cledhill 10-foot maintainer for a grader
- 1 Cledhill 7-foot pulled maintainer
- 1 Jeffrey back loader
- 1 knapsack-type portable acetylene welder.

The motor-truck fleet includes 17 dump trucks, 5 canopy trucks, a stake-body truck, 2 pick-up trucks, 2 Austin-Western asphalt distributors with 1,000-gallon tanks and one gas delivery truck with 500-gallon tank, a truck-mounted air compressor, a tractor-type truck and two flat-bottom trucks. These trucks are distributed by makes as follows: 2 Dodge, 3 Federal, 3 Ford, 1 FWD, 7 GMC, 7 International, 4 Mack, 4 Sterling and 1 White.

Personnel

The Franklin County Highway Department operates under the direct supervision of Allan Slade, County Engineer. The repair garage is in charge of W. Q. Madigan, Superintendent of Equipment, with Elden Hicks as Chief Garage Clerk.

JAEGER PAVING TEAMS Have Made It Possible to Build Roads and Airports... BETTER, FASTER, at LOWER COST



On 10-12 Ft. Slab



On 25 Ft. Slab

It is a recognized fact that the speed records made in paving concrete military roads and airport runways (exceeding 275 linear ft. per hour on 25 ft. width and 475 ft. per hour on 10 ft. width) have been made possible by the use of the finishing machine and the concrete spreader, both originated and developed by Jaeger-Lakewood engineers.

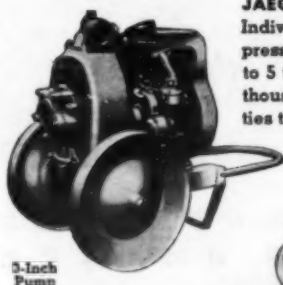
JAEGER RE-MIXING SCREW CONCRETE SPREADER, by replacing hand shovels, makes it possible to handle and spread the stiffest concrete, as dry as 1/4" slump, as fast as dual drum or multiple pavers can mix and pour. Re-mixing spreader screw eliminates all segregation, densifies and improves the strength and uniformity of the slab. Single operator spreads the piles, strikes off, ready for final finishing. Also adaptable for spreading and finishing bituminous material.

JAEGER-LAKEWOOD HIGH SPEED FINISHER is the most flexible machine ever developed for finishing dry, stiff concrete at today's fast pace. Transmission in front of engine gives direct lever control of all functions—3 working speeds of 8, 12, 18 ft. per minute and 3 independent screed speeds, all gear-selected, plus unlimited speed range by engine throttle. Hydraulic screed lift, "velvet touch" screeding, 4-5 ft. telescopic width adjustment, many advanced features. Standard and vibratory models.

JAEGER "SURE-PRIME"—the Pumps that Exceed Their Promises: Individually factory tested and certified for vacuum, capacity and pressure, regularly exceed their guaranteed performance—with up to 5 times faster automatic priming, big air and water capacity and thousands of extra hours of service. Sizes 1 1/2 to 10 inches—capacities to over 200,000 gallons per hour.

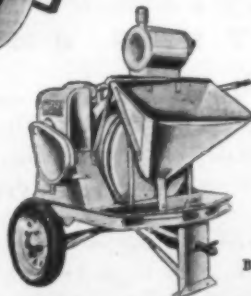
JAEGER "SPEEDLINE" MIXERS

in sizes up to one-half yard, have machined steel drum tracks, enclosed automotive-type transmission, run more smoothly and quietly. Fastest known loading and discharge. Perfectly balanced, easy to trail and move on Timken bearing wheels, spring shock absorbers.

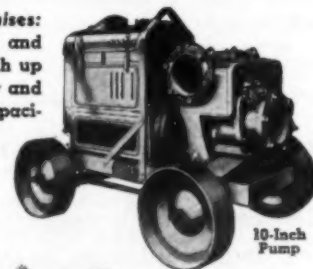


3-Inch Pump

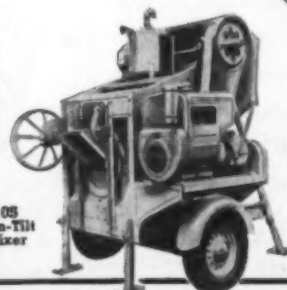
JAEGER PUMPS have patented high-velocity "Priming Jet," high pressure shells of self-cleaning design, replaceable liners, longest-life seal, oversize construction.



3 1/2" with Measuring Batch Hopper



10-Inch Pump



105 Non-Tilt Mixer

JAEGER MIXERS are the recognized leader throughout the world—for fast production, easy handling and long life, trouble-free service.



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STANDING ROOM ONLY FOR DURATION

Beebe Bros. All-Steel Hand Hoists carry the highest resale value of any piece of equipment in the world. If you have one not in use, sell it. Many more than are available are urgently needed in the win-the-war program. Thanks.

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SEATTLE, WASH.—U. S. A.

THE JAEGER MACHINE CO.

701 Dublin Avenue, Columbus, Ohio
Service in Over 100 Principal Cities

Construction Contributes To Nationwide Prosperity

(Continued from page 2)

the depression. Then, a large construction program was recommended in order to put men to work, but it was also recommended that, wherever possible, the work should be carried on without machines. This meant that the economic advantages of the program were, to a considerable extent, nullified, because the benefits of increased employment in the industries manufacturing construction machinery were lost. This is substantiated by the well-known study of the Division of Management of the Bureau of Public Roads, now the Public Roads Administration, which shows that on the basis of an annual expenditure of \$100,000,000 for highway construction, approximately 102,690 persons were employed continuously for 12 months on the work and in associated industries. For each of the 37,960 persons employed directly on the highway projects, approximately 1.7 persons were employed indirectly in industries furnishing materials, equipment, supplies and services. As we make our plans for public construction projects to play their part in providing employment in the post-war years, let us be sure that they are prepared to provide the *maximum* employment, both direct and indirect. The most efficient use of machines and men will mean more economical construction, thus spreading the amount of money available over more projects, as well as creating indirect and direct employment for more people.

Further evidence that highway construction provides the maximum employment per \$1,000,000 expended is provided by the Bureau of Labor Statistics, Department of Labor, based on studies of direct and indirect employment in ten different classifications of Public Works Administration projects. Streets and roads lead all other classifications, with 1,150,000 man-hours. It was also found that highway projects could be started more quickly, required less time to reach the maximum employment than any other classification, and that large highway projects required no more, if as much, time to reach the various stages of completion as the smaller projects.

Prosperity and Construction

The national income is a measure of the nation's production, representing the cost of producing goods and services over a certain period. What is paid out by one for the cost of production and services is received by another, and the total amount received is the national income. The maintenance of a high national income is absolutely essential to our national economy. And within certain limits in a planned fiscal policy, the national income is dependent upon the extent of employment.

Analysis of our national economy

shows that in times of prosperity or upward surge in the standard of living, a relatively small though important part of our national income has been made up of investments in the durable-goods industries. There are variable classifications of the component parts of the durable-goods groups, depending upon the school of thought of the individual economist, but all classifications include the item of "construction". In recent periods of our greatest prosperity, construction investment varied from 12 to 15 per cent of our national income. During the late twenties, public construction amounted to about 20 per cent of the total construction program, of which highways furnished slightly more than one-half the volume. The importance of the highway-construction factor in providing employment and therefore pros-

perity lies in the multiplying effect through the large per cent of indirect labor involved in the production of the materials and equipment used. The Bureau of Public Roads study referred to above also showed that the highway-construction expenditure of \$100,000,000 annually created a total value of business transacted of approximately \$315,000,000. That a reduction in the volume of construction has a serious effect on prosperity is evidenced by the drop in the volume of construction in 1927 just prior to the beginning of the 1929 financial cataclysm which heralded our most recent, and we hope our last, depression. When the financial break finally came, construction took a plunge with it, but the warning came in the decline of construction in 1927.

In this country, the size of the national income necessary to bring about full employment and therefore prosperity is from \$100,000,000,000 to \$105,000,000,000. This should mean an annual construction program of \$12,000,000,000 to \$15,000,000,000, including

private, corporation and public projects. The construction program was \$14,000,000,000 in 1942, a period of full employment and of war-stimulated prosperity. The post-war years must maintain the same high level of employment in the construction industry. How will this be done?

On the basis of past periods of high-income levels, and setting our goal of a \$15,000,000,000 construction volume, we find that private construction would account for about \$10,000,000,000, or approximately the figure of the 1920's, which would require supplementary public expenditures of \$5,000,000,000 on useful projects. This would be divided into \$3,000,000,000 for highways and \$2,000,000,000 for other public works, the proportion which has shown itself most effective in the past.

Such a construction program, particularly the highway and public-works construction program, can be readily regulated to take up its share of unemployment. It can be quickly expanded

(Concluded on next page)



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The equivalent in weight of two large battleships is the contribution of "FLEX-PLANE" in saving of steel for the last two years by use of "FLEX-PLANE" ribbon and other contraction joints.

**FLEXIBLE ROAD JOINT
MACHINE CO.**
WARREN, OHIO, U.S.A.

Post-War Prosperity Needs Road Program

(Continued from preceding page)

or curtailed as the need for construction throughout all parts of the country is evident, and it can be justified.

Private and Public Investments

How will the nation's construction program be financed? The funds of necessity come from one or a combination of three sources: 1. private investment; 2. corporation and industrial investment; 3. public investment. If the private and industrial investment is sufficiently great to equal the requirements of a \$10,000,000,000 construction program, then there need be but a minimum of public investment to meet the economic demands. There is always a need for a certain amount of public construction, including highways and other public works, and if private and industrial investment is not large enough to maintain the economic requirement, then the only other source of construction funds is the public source, Federal, state, county and municipal governments. This must vary inversely to the amount of private investment.

In prosperous times, private and industrial investment contribute a sufficient amount so that with the necessary construction requirements of the government, the required construction investment is met. But in the early post-war period of conversion of private industry to peacetime consumer and durable-goods production, there will be a slack to be made up by public investment.

Post-War Highway Work

Highway construction, better than any other construction classification, contributes directly to our national welfare and fits into the construction investment program. This industry has been developed by competitive private enterprise; the construction of highways attracts additional investments, generally of a private nature; highway construction, due to the fact that our highway transportation system is inadequate to take care of normal traffic demands, can be located in practically any part of the country; and highway projects may be started quickly, or dropped, according to employment requirements.

The distribution of the \$3,000,000,000 needed for expenditure on our highways in this post-war program includes about \$1,000,000,000 annually to eliminate the traffic bottlenecks on the most heavily traveled portion of our primary highway system. The heavily populated areas on this system surround approximately 100 cities of more than 100,000 population. This would mean an average annual expenditure of \$10,000,000 per area for the construction of arterial highways and limited-access belt-line and bypass highways. Such a program would account for about 3,000,000 employables on the jobs and in the plants and factories supplying the materials and equipment for the work.

Design NOW!

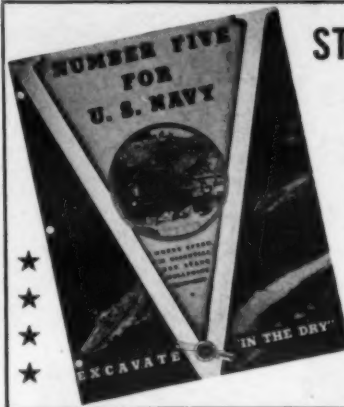
Every state, county, city and regional

area should start now to create a planned program of highway construction. Reserve funds must be accumulated to finance these projects or to participate with the Federal government on a matching or loan-and-grant basis. Federal Works Administrator General Philip B. Fleming recently stated that wasteful spending on improvised work programs would result from failure to provide plans, specifications and cost estimates for construction projects to be carried on after the war. From this warning, we should realize that if we do not have projects ready to be put under contract immediately when the need for them arises, the Administration will undoubtedly start a program of made-work along the lines of the WPA.

Most people subscribe to business carried on by private enterprise rather than by government bureaus, because the free enterprise system is an outstanding characteristic of this country, and most of us want to preserve it. In the expenditure of any funds, and especially Government funds for construction, it is

necessary that the work be carried on in the most efficient manner, in order to obtain the greatest production. It has been shown conclusively that in construction the most efficient way to carry on this type of work is by competitive bidding, with the contract for work awarded to the lowest responsible bidder.

The highway industry has an important part in the national economy. But it is up to the members of the industry to plan now so that it will be ready to make the most effective contribution to national prosperity when the war is won and the problems of economic adjustment arise in the days of peace to come.



STANG WELLPOINT EQUIPMENT

In War and in Peace

In war and in peace, contractors and engineers "in the know" use STANG Wellpoint Equipment to keep construction jobs "in the dry."

Write for this "V" Bulletin and read how STANG Wellpoints are speeding the war effort and cutting war costs—just as they can speed your jobs and cut your costs if you are a builder of drydocks, tunnels, dams, pipe lines or sewers.

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In any kind of a job, in any part of the world—regardless of climate or conditions—Cletracs do the

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BUILD FOR DEFENSE with STERLING PUMPS BOOSTS and LIGHT PLANTS

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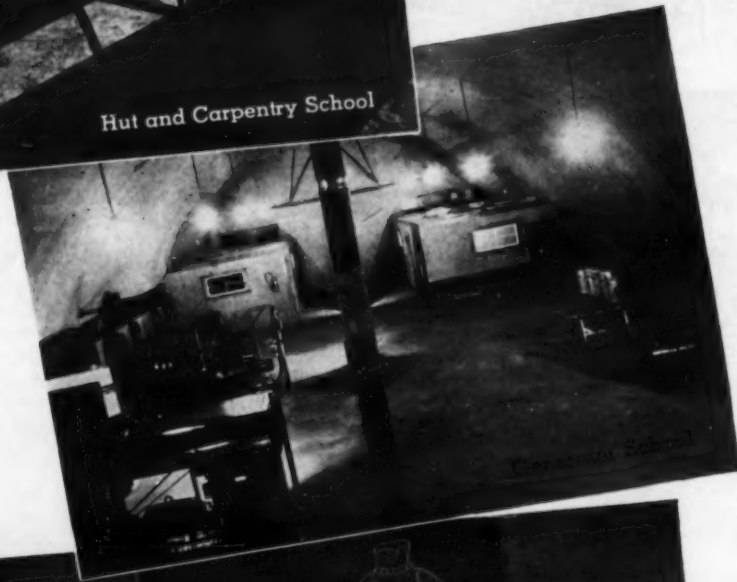
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Hut and Carpentry School



Engine School



Carpentry School



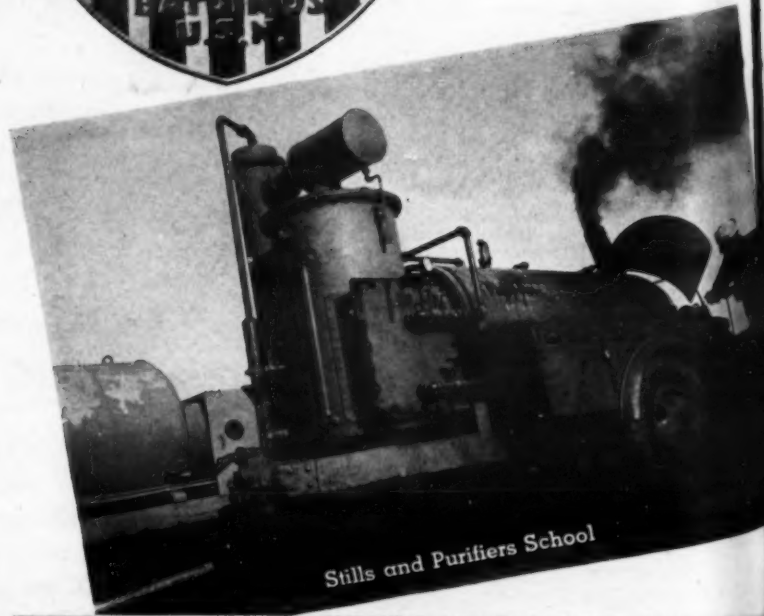
Combat Training



The Sea

Navy Construction
Trained at Camp En
To Be Versate in
And in Equipment U

(Official U.S. Photo)



Stills and Purifiers School



Training Shovel Operators

Battalion on Review



Wharf and Dock School Rig



Demolition School



Seabees

Construction Battalions
at Camp Endicott, R. I.,
Versatile in Combat
Equipment Use and Care

(Official U. S. Navy Photographs)

Road Patrol Instruction



Bulldozer Operator Training



Communications School
Field Work

Variety of Soils On Alcan Highway

Discussion of Design Problems Resulting from Soils Encountered on Route to Alaska

† IN the group of papers on various aspects of the Canadian-Alaska Military Highway which were presented at the Nineteenth Annual Meeting of the American Society of Civil Engineers in New York City in January was one by A. C. Clark, Principal Highway Engineer, Public Roads Administration, on design problems presented by soil and climatic conditions along the route of the highway.

Naturally, on a project of this magnitude, the soils problems extended over a wide range of conditions, varying from those ordinarily found in the States to those arising from conditions peculiar to the "bush country" of the far north.

Soils run the gamut from solid rock to muskeg, but relatively the amount of these two materials is small. Many discussions of the work on the Highway, particularly in the public press, have laid great emphasis on the difficulties of crossing the muskeg swamps. Mr. Clark reported that, while this material, which is classified in the A-8 group of soils, does exist, it was a simple matter in most cases to avoid it by moving the general location of the road to swing away from those areas only slightly off a direct line. Of the 300 miles between Dawson Creek and Fort Nelson, for example, swampy or muskeg conditions were encountered over a distance of 33 miles, on 30 miles of which the depth varied from 1 to 5 feet.

The best procedure to insure a stable embankment across these areas, where necessary, and one which has been practised by Canadian engineers in the construction of the Trans-Canada Highway north of Lake Superior, is to excavate all of the unstable soil and backfill with selected material. On account of the large yardage involved in the deeper swamps, it is probable that some modification of this plan, such as underfill blasting, will be adopted.

Types of Soils Encountered

Surveys of soils were made over the entire route to classify them for determining the economical thicknesses of selected borrow, base and surfacing to form a stable road. The soil types are definitely correlated with the geological



A rock-slide terrain traversed by the Alcan Highway. The initial cut was made by tractors and bulldozers, followed by others for rough grading.

formations and where the soils have been formed from cretaceous shales and fine-grained sandstones, the soil type is predominantly silty clay of the A-7 group with some heavy clays of the A-6 group and silts of the A-4 group. The silts are shallow in depth and overlie the clays. Through the mountainous

sections where limestone predominates, the soils are sands and gravels of the A-2 group, with a few silts of the A-4 group and clays of the A-7 group. In the vicinity of Watson Lake, some of the glacial silts are classified as A-5.

The lack of well-developed drainage systems contributes to the formation of

areas of frozen ground protected from thawing by an insulating blanket of moss, the existence of which at varied depths below the surface is one of the most unusual features of this area. It is estimated that about 100 miles of this frozen ground may be encountered in the Yukon territory and a somewhat less amount in Alaska. Formations of this character, called arctic tundra, most commonly are close to the surface in relatively flat areas, immediately under a heavy insulating layer of moss or grasses, although the frozen ground or ice may occur at almost any depth. Since this tundra is generally found in low areas, the highway engineer's problem is that of constructing a stable embankment over these areas. Good material will be available for the embankment itself, but the foundation will often be of doubtful supporting value.

In the construction of the truck road during the past season, the time factor was of greatest importance and embankments were built across these areas by

(Continued on page 40)

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rock drills, hand-feed drifters, motor drifters, light and medium-weight self-rotating stopers, jackhammers and demolition tools, and sheeting drivers. Wagon drills, diamond core drills and rock-drill accessories take up the next few pages, followed by rock-drill mountings, backfill tampers, clay diggers, and a complete line of tools for use with clay diggers. Then follows air-driven concrete vibrators, riveting hammers, rivet busters, scaling hammers, chipping and caulking hammers, air-powered rotary wrenches, wood borers, grinders and surfacers. C-P sludge and sump pumps are included, followed by standard and heavy-duty hammer drills and electric drills.

Copies of this 60-page catalog No. 600 will be sent promptly in response to requests directed to the company and mentioning this item.

Simplified Practice Data Available on Wire Rope

A simplified practice recommendation important to our war program has been released by the Division of Simplified Practice, National Bureau of Standards. This recommendation, R198-43, covers wire rope and was developed by engineers of the rope industry to serve as a wartime conservation measure and as a guide for post-war practice. It passed through the regular procedure of the National Bureau of Standards, at the request of the War Production Board.

General adherence to the recommendation will result in a net reduction in variety from 973 to 643, or 33.9 per cent. The major production and use of wire rope, and therefore the predominant tonnage, is covered by four

different constructions, where the reduction in variety will be from 352 to 182, or 48 per cent.

Printed copies of this recommendation contain, in addition to the simplified list, a brief history of its development and a list of the firms, organizations and governmental establishments that accepted the program, and may be obtained from the Superintendent of Documents, Government Printing Office, Washington, D. C., for 10 cents each.

Army-Navy "E" Awards

Two more companies in the construction-equipment field have been awarded the Army-Navy "E" for excellence in production. They are the LaPlant-Choate Mfg. Co., Cedar Rapids, Iowa, and the Peoria, Ill., plant of the Willamette-Hyster Co.

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Grading and Paving Access Road in Ohio

(Continued from page 2)

Excavation, unclassified	631,443 cu. yds.
Drainage structures (Mostly 15 to 66-inch reinforced-concrete pipe)	49 units
Drain tile, 6-inch	36,000 feet
Fencing, standard right-of-way fence	62,331 feet
Concrete pavement	289,000 sq. yds.
Plain and reinforced-concrete sewer pipe, 8 to 60 inches	18,695 feet
Guard rail	19,010 feet

The largest structure, a 3-cell reinforced-concrete box, each cell of 11-foot span, 9 feet high, 196 feet long with 21 feet of fill on top, needs only blast walls at the ends to make a bomb shelter.

Rough and Fine Grading

The rough grading, which included practically all of the 631,443 cubic yards of unclassified excavation, was handled by three 30-yard LaPlant-Choate Carrimor scrapers and three 15-yard LeTourneau Carryall scrapers pulled by D8 tractors with one extra used as a pusher. All of the embankment fill, as well as classified backfill, was compacted by four sheepsfoot rollers. The grade was given its final trim by a Caterpillar No. 12 power grader.

In all cuts where poor subgrade material was encountered, a 10-inch thickness of classified backfill was spread. This consists of pit-run gravel with maximum 3-inch stone, at least 40 per cent of which must pass a No. 10 screen and from 0 to 15 per cent may pass a 200-mesh screen. The layer is 10 inches thick at the mall side and was given a $\frac{3}{8}$ -inch per foot slope on the bottom to drain tile located $2\frac{1}{2}$ feet outside the pavement. This material was hauled by trucks from the borrow pits, dumped on the subgrade, and spread by a D8 tractor with a LeTourneau bulldozer. A total of 60,000 cubic yards of pit-run gravel was used as selected backfill.

The first operation on forms and fine grade was cutting the form trench to line and grade with a Cleveland Formgrader. This operation was followed immediately by four form setters, with eight helpers and two men for driving pins, who set the 9-inch Heltzel steel road forms. A total of 4,500 feet of forms was maintained on this job because of the speed of pouring. To cut the subgrade to proper contour for the thickened-edge 24-foot pavement, an R-B power-operated subgrader ran on



C. & E. M. Photo

Replacing a section of poor subgrade with a 10-inch layer of selected backfill of gravel on an access road in Ohio.

the forms. This was followed immediately by five men doing the hand work on the fine grade which was checked by a pin template pushed by hand. A 10-ton 3-wheel Galion Chief roller was used for the final compaction of the grade.

Behind the fine-grade crew came three steel men who set the expansion joints and also the $\frac{5}{8}$ -inch round deformed

bent tie bars spaced 5 feet apart and set in metal forms tied to the steel road forms to create a key and bond between adjacent slabs. Two men oiled the forms and keys.

Expansion Joints

Expansion joints on these projects were spaced 120 feet apart, using $\frac{3}{4}$ -inch Carey Elastite premoulded joint

material encased in two off-set metal shields. The joint material was set $\frac{1}{2}$ inch below the top of the forms to permit pouring the joint after curing was complete. Each expansion joint had ten $\frac{3}{4}$ x 15-inch round dowels piercing it, greased and capped on one end and wired at both ends to welded rod frames to keep the dowels parallel to the axis of the concrete slab.

The contraction joints were cut transversely every 20 feet and $\frac{1}{8}$ -inch ribbon inserted.

Pouring 200 Feet an Hour

The batching plant for this job was located an average haul of 4 miles from the center of the project. The contractor ran ten 2-batch trucks with separate containers for the cement for the 8-sack batch. The actual batch weights, on the day of our visit, were:

Sand	1,600 pounds
No. 4 stone ($\frac{3}{4}$ to $1\frac{1}{2}$ -inch)	1,451 pounds
No. 3 stone ($1\frac{1}{2}$ to 2-inch)	1,432 pounds
Cement	752 pounds
Water	31.6 gallons

(Concluded on next page)

RAILROADING CROSSES A NEW FRONTIER



Today on the Great Northern, GM Diesel Locomotives like this are hauling heavy war loads through "The Great West." On one mountain operation, consisting chiefly of movement of metal vital to victory, the utilization of GM freight locomotives resulted in an increase of 50% in train-hauling capacity.

THE GREAT WEST.

Here Currier and Ives, the famous portrayers of American life of the past century, depict one of the great eras of railroading—the achievement of rail transportation from East to West—the opening up of new lands and unexploited resources.

WARS have a way of ending old eras and starting new ones. Following the Peace of 1865, the nation was first united from coast to coast by bands of steel (May 10, 1869). Geographically, America has no new frontiers. Technically we have many. The curtain already has been drawn back on one element of the new era that surely will follow the present conflict—a new tool for the improvement of national transportation—General Motors locomotives.



Reconstruction and new construction are going to need plenty of this hard-hitting, easy-on-the-fuel power. With normal refinement and development speeded up by war, with production expanded, GM Diesels will be ready to serve in more fields and in more ways than ever.




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WATERLOO, IOWA

New Divided Highway For Air-Base Traffic

(Continued from preceding page)

The 24-foot pavement on each side of the mall on this project was poured as two 12-foot lanes because Ohio specifications forbid the pouring of any pavement wider than 22 feet as a single slab. Pouring narrower slabs provides a better finish and riding quality because the lighter weight finishing machine produces less settlement and misalignment of the forms than the exceedingly heavy equipment necessary to pour the wide slabs. Just ahead of the paver three men were kept busy lining up the forms to insure the riding quality of the pavement and to make up for any misalignment caused by the operation of the heavy subgrader.

Water for mixing the batches in the Ransome 34-E dual-drum paver was furnished by tank trucks. The batches were mixed 37 seconds in the first drum and 42 seconds in the second drum of the paver, to meet the specifications of a 1 1/4-minute mix. As the expansion joints were set on the grade well ahead of paving, the Ransome 34-E machine was run outside the forms and one man kept the grade between the forms wet to prevent loss of moisture from the concrete. As the batches were dropped every three-quarters of a minute on the subgrade, a Blaw-Knox mechanical spreader distributed them uniformly between the forms. Two puddlers worked outside the forms to prevent any concrete falling over the side. Every foot of concrete next to the forms was vibrated. The vibration was handled in a manner new to us and one so effective that it is worth recording in words as well as illustration (See page 2). The power plant of the vibrator was mounted at one side of the Blaw-Knox spreader and a narrow platform built across the back of the spreader so that the vibrator man could move the working end of the vibrator from one side of the slab to the other without having to walk in the concrete or climb over the machine. From the standpoint of safety and efficiency, this is highly commendable.

This paving outfit regularly poured 1,600 feet of the 9-8-8-9-inch concrete slab in eight hours and had a one-day maximum of 2,200 feet.

Finishing and Curing

The concrete spread by the Blaw-Knox machine was immediately finished by a Jaeger-Lakewood 2-screed finishing machine with two men shoveling to the strike-off screed to insure a sufficient roll of concrete for surface compaction and uniformity of finish. Back of this two hand finishers used a 10-foot aluminum drag straight-edge and worked out any inequalities in the surface with 4-foot long-handled floats. Two men on a rolling bridge cut the center joint and inserted the ribbon cut from roofing paper and then the next two finishers edged the pavement and pulled a canvas drag over the surface to give a uniform surface. Two other men with a separate rolling bridge edged the expansion

joints. One man used a fiber broom to give the final surface finish. It is interesting to note that Ohio is one of the states which uses a "roughometer" on the pavement to check for irregularities greater than 1/4 inch in 10 feet after the broom finish is completed and the pavement at least one day old.

Burlap for the initial curing was piled ahead on wooden platforms and wet down by the man with the hose for wetting the subgrade ahead of pouring. Four men picked up the wet burlap and spread it out on a rolling bridge and then transferred it to the pavement where it was left and kept wet for 24 hours. Following this, Sisalkraft paper was spread over the surface, weighted at the edges with earth to seal it and to prevent its blowing off the pavement, and kept in place until beam tests showed that the concrete had reached its specified strength. This usually occurred about three days after pouring, with a reasonable margin of strength.

All vehicles were kept off the slab even after this time until the expansion

joints had been poured. The crew for this work consisted of two men with a Littleford heating kettle.

Personnel

The contracts for the relief route for U. S. 25 north of Dayton toward Vandalia were awarded to Carl Myers and Peirce Construction Co. of Toledo, Ohio. Heavy grading and pipe structures were done by Carl Myers, and

Peirce handled the concrete paving. For Carl Myers, Don Bethel was Superintendent on heavy grading, and Elmer Maiden was Superintendent on light and finish grading and pipe structures. Richard Peirce was Superintendent for Peirce Construction Co. on concrete paving and reinforced-concrete structures. For the Ohio Department of Highways, Joe Vollmar was Project Engineer.

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Servicised is the only manufacturer of four different available types of Expansion Joints for concrete construction. These joints are known as: Asphalt Joint, Fiber Joint, Cork Joint and Self-Expanding Cork Joint, and are widely specified in Airport

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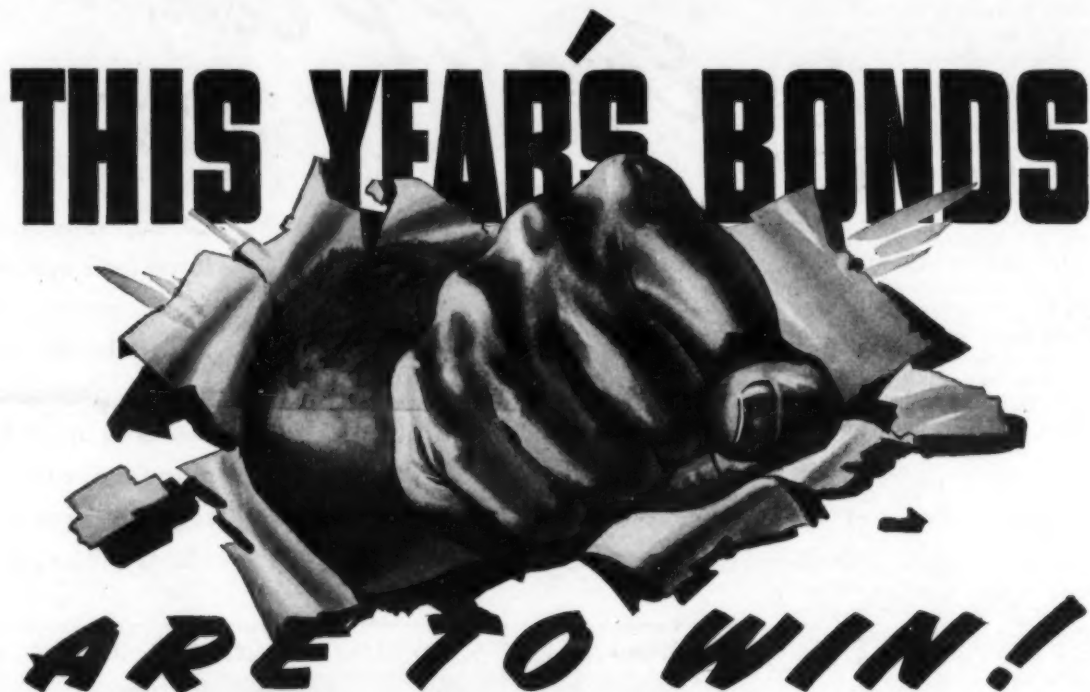
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Sure, there is—but how long is it since you've done anything about it? These plans won't run without winding, any more than your watch! Check up on it today. If it doesn't show substantially more than 100% of your plant's pay-roll going into War Bonds, it needs winding!

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By so doing, you help your na-

tion, you help your workers, and you also help yourself. In plant after plant, the successful working out of a Pay-Roll Savings Plan has given labor and management a common interest and a common goal. Company spirit soars. Minor misunderstandings and disputes head downward, and production swings up.

War Bonds will help us win the war, and help close the inflationary gap. And they won't stop working when victory comes! On the contrary—they will furnish a reservoir of purchasing power to help American business re-establish itself in the markets of peace. Remember, the bond charts of today are the sales curves of tomorrow!

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THIS SPACE IS A CONTRIBUTION TO AMERICA'S ALL-OUT WAR EFFORT BY
CONTRACTORS and ENGINEERS MONTHLY

Start Designs Now For Post-War Roads

(Continued from page 2)

Administration, looks forward to "a new cycle of road building, because many of our existing highways will have become obsolete or worn out; because we shall badly need, at the city ends of the system especially, new facilities (express highways) to enable large numbers of people to travel short distances fast and give them a place to dispose their vehicles when they stop (terminals and off-street parking facilities)."

At the end of the war, there will be a resumption of the trend toward more vehicles on the road, and greater yearly mileage per vehicle. This means that congestion on urban roads, and on those linking large population centers, will be even more critical than before the war. Within a few months after war ends, we can expect mass production of 1942 automobile models with few basic changes. New designs would mean delay for extensive retooling of plants, and the first need will be for employment, as well as for new cars to replace the 5,000,000 being forced off the roads in 1941, 1942 and 1943 by obsolescence.

Major General Philip B. Fleming, Federal Works Administrator, put his finger on the post-war planning needs when he stated at a meeting of the Washington Building Congress that the kind of public works program he has in mind cannot be improvised over-night.

"As I see it," he said, "the type of planning for public works which we need now is one in which the preliminaries will be gotten out of the way before the war ends: the sites will be acquired, the legal conditions will be met, the plans for financing will be made, the blueprints will be drawn and the specifications written. And then, in the hour of need, we can pull the blueprints out of the cupboard, hand them to the contractor, lead him out to the site and say, 'You begin digging here at 7 o'clock tomorrow morning.'"

"Thus, each project can be started at a time when the jobs it will create are most needed, and when it can best be financed. Projects can be speeded up or slowed down as the necessities of the employment situation dictate. It is in such overall nation-wide planning for post-war public works that I hope the

Federal Works Agency will be permitted to participate."

Right-of-way acquisition is one of the most important preliminaries to "start digging here", so any post-war highway construction program must include that slow legal process of acquisition of land, starting now. Well-planned engineering projects cannot leave the drafting room in a day, or even in a year. Therefore, preparation of plans and specifications must be begun now. Delay is a sad mistake; it is later than you think. Blueprints cannot be transformed into completed projects without finances; this important aspect of the post-war highway program must have its share of consideration and preparation now. Success in handling the post-war construction program depends largely on the kind of planning we do today.

Needs of Urban Areas

Post-war planning for urban areas is receiving first attention from many highway departments. The State Highway Planning Surveys show that 84 per cent

of all motorists average less than 20 miles per trip. Trucks similarly travel short distances, from rail terminal to factory, from wholesale outlet to retail

store. Only 5 per cent of our highway trips are 50 miles, 2 per cent over 100 miles. We need good roads for the small
(Continued on next page)

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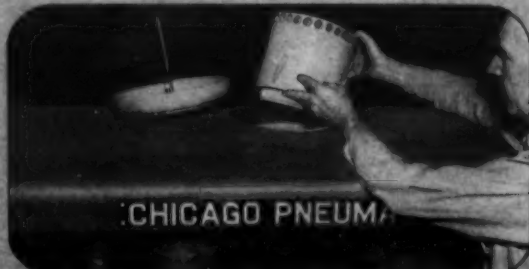
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CP Portable Compressors are equipped with a force feed system of lubrication which is automatic, positive, economical — and which also keeps the air relatively oil-free. Nevertheless, for the dependable, uninterrupted service so essential under war conditions, there are a few manual operations which should be performed regularly. Four of these are illustrated below; others will be presented in future advertisements.

HOW TO GET MAXIMUM SERVICE FROM YOUR CP PORTABLE COMPRESSORS



1 Remove air intake filter, clean with kerosene weekly. Dry all parts before replacing. Fill oil to bead indicated on outer casing.



2 Lubricate the fan bearings with a grease gun every three hundred operating hours. Use a semi-fluid grease of good grade.



3 Keep crank case filled to indicated level. Drain every 100 operating hours. Refill with grade of oil specified in instruction book.



4 Get the habit of checking compressor and engine oil pressure gauges frequently on each shift. Pressure should be about 25 lbs.

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New Urban Highways Vital Post-War Need

(Continued from preceding page)

minority of long-distance travelers, but we must concentrate on the cities and their tremendous traffic needs.

G. Donald Kennedy, Vice President, Automotive Safety Foundation, speaking before the Highway Officials of the North Atlantic States, brought out forcibly the coordination necessary between city planners and highway engineers in the reconditioning of our cities as part of the post-war construction program, stating, "Another post-war condition will be efforts to rebuild our cities, wiping out slum districts, eliminating traffic blights, opening light and air and playground and terminal facilities, and off-street parking and low-cost housing. Such developments will naturally occur around central business districts where lowered property values have been developing for years as the motor car has decentralized the population.

"So our highway engineers must offer to work closely with city planners on this program. We are talking here of highway construction drawings, and not just planning. Every effort should be made to anticipate future city developments and to draft our highways accordingly. I think we should stress speedy progress on highway programming, and immediate purchase of right-of-way. In some cases, limited-access belt lines encircling the city should be built, creating by-pass routes as well as connections between main radiating arteries."

Just how has this urgent need for improved highway construction in urban areas been created? Road builders in the past stopped their road building at the corporate line of the city, town or village. Right up to each city line the highway was of the same type and the same dimensions, in other words the same facility for miles away from the city. City administrations, busy with their layouts of streets at right angles, failed to differentiate between the streets which joined the main inter-urban routes and those which did not. But they have found that the traffic developed a difference. This traffic has piled up on those city streets and adjacent rural highways so that right now these routes are misfits for the job they must do. The roads may be all right as they get far enough away from the cities, but the bulk of the traffic does not go that far.

In such places as this, and there are many hundreds of them in the United States, we shall need to build express highways in the post-war period. These should be super-highways for short-distance, not transcontinental, travel and should not by-pass cities. This is substantiated by the Highway Planning surveys which show that, on every main road approaching a large city, from 80 to more than 90 per cent of the traffic counted was bound from, or destined to, the city itself. The design and construction of these urban express highways will require a "seeing eye-to-eye" by city, state and Federal authorities—relationships which have not yet been properly established.

Over 18 months ago, the Texas Highway Department realized the need for better urban highway planning and the creation of proper parking facilities, and in January, 1942, published suggestions for the improvement of urban highway routes and parking facilities, dealing with the flow of traffic through cities, the planning of orderly parking, and the development of urban arteries and by-passes.

The introduction to this bulletin states that the problem of by-passing highway traffic would never have arisen if cities and towns had provided ample arteries to permit a free flow of traffic through urban areas. Highway traffic should be spread into various arteries as it approaches a city to give access to the outlying sections of the city and to permit easy flow on broad uncrowded streets rather than converging traffic to the congested business center. Many city traffic lanes can be cleared by the use of public properties and well-planned street parking. In addition to street parking, municipalities can co-

operate with state highway officials who are planning urban highways by providing public parking lots to take traffic off the streets and thus release at least two additional traffic lanes on each urban route. In all cities, some tax-delinquent properties exist which could be leased temporarily for such use, and at no cost until back taxes are paid off.

It is also pointed out that, should the adoption of the foregoing measures not

prove feasible, it is necessary to resort to a by-pass. From past experience, by-pass routes constructed in open rural areas soon become built-up suburban streets; therefore, broad rights-of-way are suggested to protect the by-pass from commercial encroachments. At planned intervals, narrowed right-of-way widths permit the orderly growth of business sections on the by-pass. In directing the

(Continued on page 50)

ACT NOW! ON NEXT WINTER'S REPAIRS for DAVENPORT-FRINK SNO-PLOWS



You can't start too soon to think about keeping your highways open next winter. Check over your repair requirements, then place your orders EARLY. We'll do the best we can for you. Priorities are required and higher priorities are demanded on some parts than on others. By acting promptly you may be able to avoid the cost and inconvenience of snow-blocked roads. Delay may mean disappointment.

DAVENPORT BESLER CORPORATION Dept. A Davenport Iowa
Made in Eastern U.S.A. by CARL H. FRINK, 1000 Islands, CLAYTON, NEW YORK

INTERLOCKED PROPORTIONING

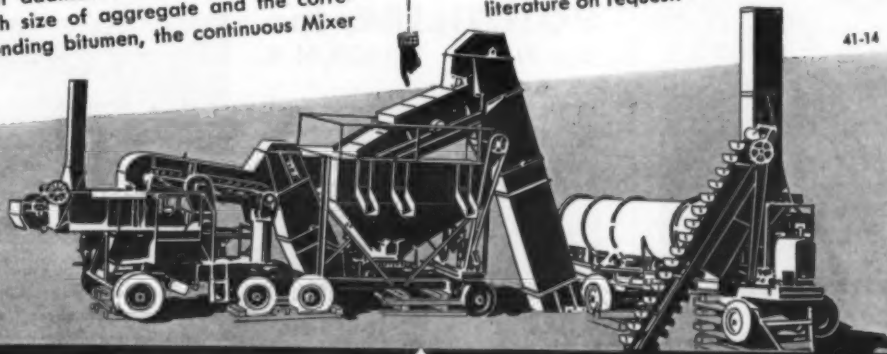
ONLY in the Continuous Mixer is the ratio of aggregate to bitumen mechanically interlocked. The volumetric proportioning is calibrated by weight, the ratio set and locked, and the entire job run with interlocked proportioning.

Even the most skillful mixer operators cannot maintain, hour after hour, the untiring precision of interlocked proportioning.

In addition to accurately measuring each size of aggregate and the corresponding bitumen, the continuous Mixer

constantly feeds the aggregate and bitumen into the pugmill in a small continuous stream—in practically a homogeneous distribution at the start of the mixing.

These advantages plus the unequalled economy of the Continuous Mixer make it truly tomorrow's Mixer today. Regardless of your present equipment, you should at least have a complete understanding of the basic principles of the Continuous Bituminous Mixer. Complete literature on request.



BARBER-GREENE
AURORA ILLINOIS

SAVE 50% ON FUEL AND WAITING TIME

when Heating and Melting TAR & Asphalt

USE THE FAMOUS HEET-MASTER

AEROIL BURNER CO., INC.
5775 Park Avenue, West New York, N. J.

Handling "Tundra" In Road Construction

(Continued from page 34)

the quickest feasible method, generally by corduroying with brush and poles, and following with a light fill of good granular material. For the permanent road, however, if a more solid foundation can be reached by stripping the vegetation, this should be done. If this vegetation is underlain by a frozen silty-sand, stripping greatly increases construction difficulties and results in a foundation which for a time is anything but stable. Experience indicates that if time is available, the most satisfactory method from a permanent construction point of view is to clear the right-of-way, strip the vegetation with bulldozers, shape the surface thus exposed so that surface water will drain, and then leave it alone until it has had time to become relatively stable by thawing, drainage and evaporation. This method has been used extensively by the Alaska Road Commission.

While this method involves extending the work over considerable distances, it need not delay operations if they are planned with this procedure in mind and the clearing and stripping are done far enough in advance of actual grading.

In areas so flat or low that drainage is impracticable, it is not considered advisable to strip the vegetation unless the underlying material is of a type naturally stable even when saturated. If the vegetation is not stripped, a fill of 3 feet or more should be constructed, with the lower part of the fill a porous granular material which will permit the escape of water released by thawing and forced out by the weight of the fill. While the moss loses some of its insulating value when compressed, this would be compensated by the insulating value of the fill so that no thawing will take place under it. As a factor of safety against unforeseen developments, fills should have broad bases and flat side slopes. When temperatures and other conditions permit, consideration may be given to stripping the moss and placing the fill directly on the frozen ground before thawing occurs.

Design of Road

The subgrade design of the Alcan

Highway follows standard practice, and three layers of material above natural soil are provided, selected borrow, base course and surface course. The base and surface courses are each 4 inches thick, while the selected borrow varies between 6 and 16 inches in depth, depending on the classification of the subgrade soil. Where A-6 and A-7 soils are encountered, a total thickness of 24 inches of selected borrow, base and surfacing are placed; where A-4 and A-5 soils are found, they are entirely removed or mixed with heavier clays and treated as A-7 soils.

Selected borrow is being obtained from deposits of fine sand, sandy gravel, or from sandstone ledges. Borrow is generally of A-2 classification, although some fine-grained A-2-4 sands are being used. Because of the scarcity of sand and gravel deposits on certain sections of the route, it is necessary to use sandstone ledges for selected borrow. Most ledges require drilling and blasting but, although the rock comes out quite blocky, it is not necessary to resort to

crushing as the material readily breaks down during normal subgrade-shaping operations.

Base-course material is being obtained from gravel deposits and sandstone ledges, and is crushed to a 2-inch maximum size with a gradation controlled to provide a dense stable base. Surface-course material is being obtained from sandy gravel deposits, and is crushed to 1-inch maximum size and the gradation and quality carefully controlled.

One problem of considerable importance is the compaction of the heavy clay soils. These are difficult to excavate and are of massive rubbery form when placed on the grade, with a moisture content above the plastic limit even during the driest season. This necessitates considerable manipulation to lower the moisture content and obtain proper compaction. Sheepfoot rollers are used for compaction and it has been noted that they speed the drying process by reducing the aggregations to smaller size, in addition to compacting the soil.

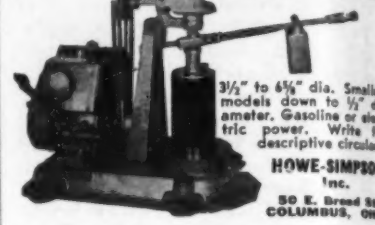
Drainage

Through the mountain sections, considerable water is encountered under all varieties of conditions, and many drainage ditches and subdrains will be required. Serious problems develop where the road crosses large alluvial fans at the mouths of box canyons. These problems are now being studied to determine the best solution, whether

(Concluded on next page)

NEW H-S PORTABLE ABRASIVE CORE DRILL

For heavy drilling of reinforced concrete—taking test cores in concrete highway construction and floor slabs. Drills holes 3 1/2" to 6 1/4" dia. Smaller models down to 1/2" diameter. Gasoline or electric power. Write for descriptive circular. **HOWE-SIMPSON, Inc.** 50 E. Broad St. COLUMBUS, OHIO



For building
BETTER HIGHWAYS
to the **SKYWAYS**

ROTOTILLER
TRADE MARK REG. U.S. PAT. OFF.
ROADMAKER

SOIL STABILIZATION is speeding military operations wherever our armed forces are or go. Using local materials or any others available, highways, landing strips and airfields can be built or repaired faster, better, more economically.

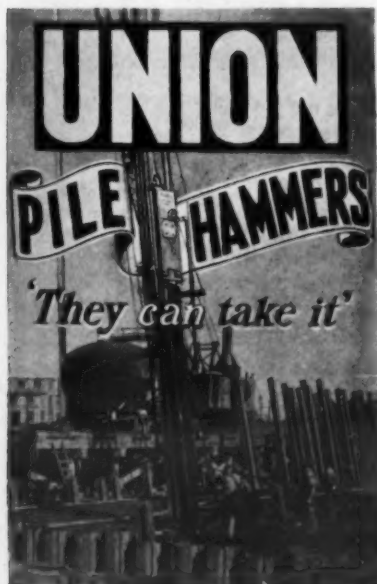
ROTOTILLER Roadmaker is the pioneer "3-in-1 Rotary Action Machine" especially designed and built for soil-cement and soil stabilization work. The "3-in-1 Rotary Action" assures more accurate control in both wet and dry mixing operations as well as more thorough pulverization of materials. The fast-revolving, self-sharpening tines thoroughly mill the earth from top to bottom to a depth of 12 to 18 inches in one operation. GET THE FACTS on this 1943 job-tested ROTOTILLER Roadmaker. Write for descriptive literature.

ROTOTILLER, Inc.
Dept. N TROY, N. Y.

7 STAR FEATURES

1. Improved, self-sharpening, single unit spring-tines.
2. 4-speed transmission permits use for scarifying as well as mixing.
3. Flexible tilling unit gives fast, easy operation; sharp turns with safety.
4. Weight of tilling unit variable to suit conditions; lessens wear.
5. Depth of operation regulated to within one-half inch.
6. Powerful 6-cylinder Chrysler motor operates economically on 1 to 2 1/2 gallons of gasoline per hour, depending on conditions.
7. Strong, dependable ROTOTILLER Roadmaker cuts 6 ft. wide, 12 to 18 inches deep, with complete ROTOTILLAGE across entire width of cut — no untillage areas.

Post war plans undoubtedly will call for thousands of miles of soil-cement and stabilized secondary roads. Returning soldiers will find economic security in this work. Then, as now, ROTOTILLER Roadmaker will serve faithfully and well.



EST. 1900
Union Iron Works, Inc.
ELIZABETH, New Jersey



ABOVE: Mixing clay and sand to depth of 12 to 14 inches on experimental project for U. S. Naval Construction Battalions (Seabees). Note fine pulverization and uniformity of mix.

LEFT: Scarifying to rebuild old road.

RIGHT: ROTOTILLER Roadmaker takes sharp turns with safety without taking tines from ground or stopping tillage unit.



Varied Soils Problems Met on Alcan Highway

(Continued from preceding page)

by placing grade lines high and channel control by jetties, or avoidance by routing the highway around the difficult section.

In laying the grade line, the object will be to provide drainage and protection from capillary moisture and to accomplish this, much of the completed road will be at a higher level relative to the surrounding ground than the existing pioneer road. The grade line will be rolled with the contour of the country as far as practicable, and no attempt will be made to produce long grade tangents. Vertical curves will be flattened to provide safe sight distances, with 1,000-foot sight distance as the ruling minimum, except where excessive yardage would be involved.

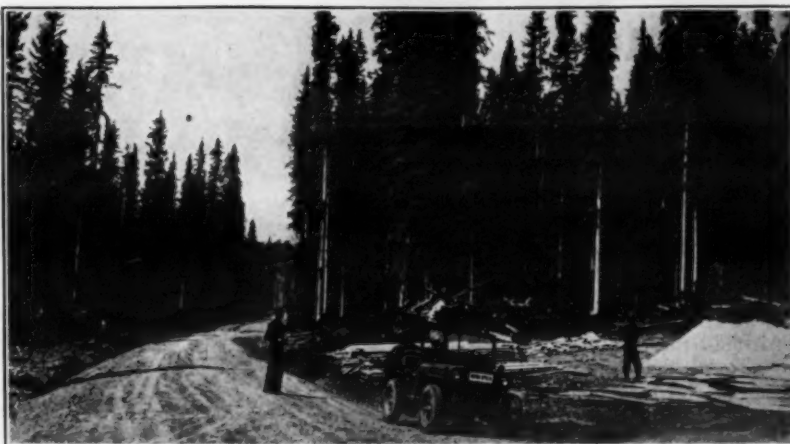
On fills less than 2 feet in depth, slopes will be flattened to 2 to 1, further depth of fill to take the natural slope. In frozen ground, consideration will be given to using 4 to 1 fill slopes on shallow fills and if winter observations indicate the necessity, these slopes may be further flattened even on higher fills.

Ruling grades are not to exceed 5 per cent, the maximum grades 7 per cent; curvature on prairie terrain is not to exceed 3 degrees, in mountainous sections, 19 degrees on open sight distance and 16 degrees where sight distance is obscured or blind; all curves will have standard spirals and widening of the road bed for curvatures above 3 degrees.

It will be necessary to put forth every effort to complete the crushed-stone or crushed-gravel surfacing of the entire highway this year. Construction will be in progress over practically the entire length of the project and final hard-surfacing operations will not be undertaken until the grading is stabilized.

New Road Links Mazatlan With Interior of Mexico

A new 424-mile highway which will connect the Mexican cities of Torreon and Durango, in the state of Durango, with the Pacific port of Mazatlan is now nearing completion, according to a recent report in *Foreign Commerce Weekly*. Torreon is located on the central



Gravel surfacing and adequate drainage by side ditches keep the Alcan Highway usable during the period of thaw.

plateau region in the middle of a rich cattle and agricultural region, about half way between the Atlantic and Pacific Oceans. The town of Durango is almost in the center of the state of the same

name, in a region noted for its agricultural and mineral resources.

Mazatlan is on the Pacific Ocean near the southern end of the Gulf of Lower California and has an excellent deep-

water harbor. Opening of this new road will permit Pacific Ocean trade to reach the interior of the country through Mazatlan. By connecting the three towns and cities, the new highway is expected to open to development and trade a rich region heretofore not fully developed.

The projected highway which will eventually run northward from Guadalajara, Mexico's second largest city, to Nogales on the United States border will cross this new Torreon-Mazatlan Highway at a point about 55 miles inland from Mazatlan at the town of Coyotitan.

These new highways are part of the rapidly expanding transportation system in Mexico which is gradually ending the isolation of important regions and thus bringing trade to many parts of the Republic of Mexico hitherto almost untouched.

Every fighting man requires 4,900 pounds of steel. Therefore you must collect and turn in 2,450 pounds of scrap for every man from your organization in the armed forces.

POZZOLITH CONCRETE CEMENT DISPERSION SPEEDS 15 ACRES OF FLOOR SLAB



120 DAYS AGO...

This mammoth floor slab — 300' x 300' — was placed and finished at war speed with Pozzolith Concrete.

In floor construction Pozzolith produces maximum durability by having low water content . . . low cement paste factor . . . yet good mobility of mix plus good cohesiveness, and strength well above requirements.

TODAY...

In tooling up — 40 ton machines skidded over this floor — did no damage to slab or surface, "it just gave it a polish" — practical evidence that Pozzolith Concrete can take it.

Speed — Durability — Economy . . . three reasons Pozzolith has been used in millions of cubic yards of concrete on war plant construction, including —

12 Shell Loading Plants	32 Factories
7 Aluminum Plants	3 Ship Yards
4 Small Arms Plants	17 Ordnance Plants
8 Giant Aircraft Plants	4 Army and Navy Bases

Write for Illustrated Pozzolith booklet and complete information on Cement Dispersion.

THE MASTER BUILDERS CO.
CLEVELAND, OHIO • TORONTO, ONTARIO

FOR DISPERSION IN MASONRY MORTAR.
Use "O. M." OMICRON MORTARPROOFING

HOW POZZOLITH The Cement Dispensing Agent IMPROVES CONCRETE



"Flocculated"



Dispersed

Remember in physics how a group of suspended pith-balls would fly apart when given an electrostatic charge?



Flocculated



Dispersed

Similarly, cement particles which bunch together in water, or flocculate, are separated by this same electric force when Pozzolith is added to the mix. Thus greater cement surface area is made available to hydration, resulting in . . .

1. Putting more of the cement to work, by increasing the amount of hydration as much as 40%.
2. Increasing workability, producing up to 2½ times as much slump with the same amount of water.
3. Permitting up to 20% reduction in water, maintaining placeability . . . increasing strength . . . watertightness . . . and durability.

Plan Ahead for

KINNEY

**BITUMINOUS
DISTRIBUTORS**



We're sorry that the urgent requirements of war production prevent our accepting orders now for Kinney Bituminous Distributors. When the war is won, these reliable distributors . . . well known for 33 years . . . will again be available, designed for new road building methods and with further improvements for most efficient and economical operation. Plan now for the future . . . and remember KINNEY.

KINNEY

MANUFACTURING CO.
3531 Washington St., Boston, Mass.

BRANCH OFFICES
New York Chicago Los Angeles
Seattle Philadelphia San Francisco

MASTER BUILDERS

Building an Airline In Jungle and Desert

PAA-Africa Completed an 8,500-Mile Airline within Year in Face of Enormous Difficulties

(Photos on pages 1 and 64)

† THE story of how a Pan American Airways' army of "young Americans in overalls" built an 8,500-mile airline across Africa and on into India, over which men, supplies, and planes could quickly be delivered to the Allied fighting fronts of the Middle East, can now be told in part.

To know the conditions in Africa which had to be met, how supplies would have to be sent thousands of miles across the Atlantic and on to advance bases and in what amounts, and finally what peculiar engineering problems would have to be solved in building and maintaining such an airline, Pan American Airways, who developed the line in co-operation with the Air Transport Command, had only the scantiest preliminary information. The British had been flying some commercial planes over the proposed route, but only on an intermittent basis and without benefit of complete established facilities. So a group of officials and engineers of Pan American Airways flew the route, located favorable base sites, and gathered information on local facilities available for the construction men who were soon to follow.

Meanwhile a complete and self-contained organization was developed in New York to handle all general technical problems connected with the establishment of the airline. To this group went reports from the advance agents in Africa as to requirements and from the New York group orders flowed out to every part of the United States for the needed supplies.

Credit for establishing the airline goes to Franklin Gledhill, General Manager of PAA-Africa; to E. R. Littler, Chief of Construction; and to W. A. Creamer, Assistant Chief of Construction.

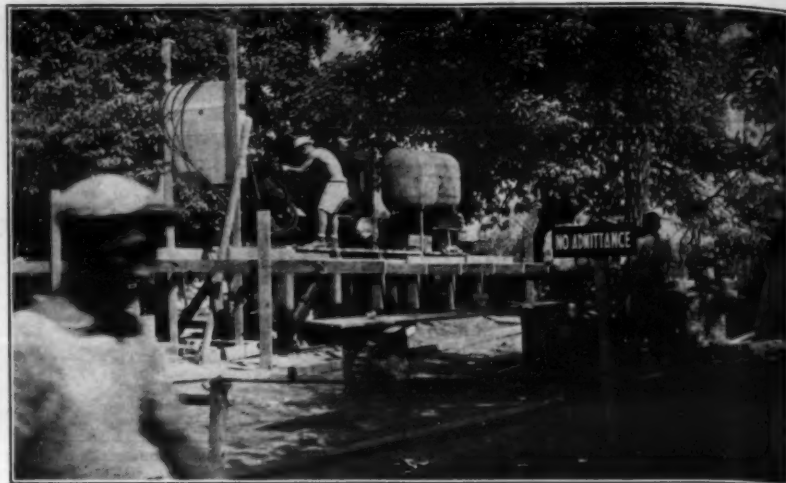
Outline of Work

PAA's construction job became that of enlarging and improving existing air

fields in order to handle properly any size plane which might use the route, establishing the necessary handling facilities for maintaining operations, and providing living accommodations for PAA personnel, for plane crews and passengers.

Air-field runways in existence generally proved inadequate, both in length and width, for the demands of war, and part of PAA's job was to expand them. As larger and larger planes passed over the route, runway lengths became progressively longer until at times they measured well over a mile, with widths correspondingly increased.

Laterite and jigglin, both local materials, proved satisfactory for runway construction when water-treated, rolled and paved with asphalt. Most of the



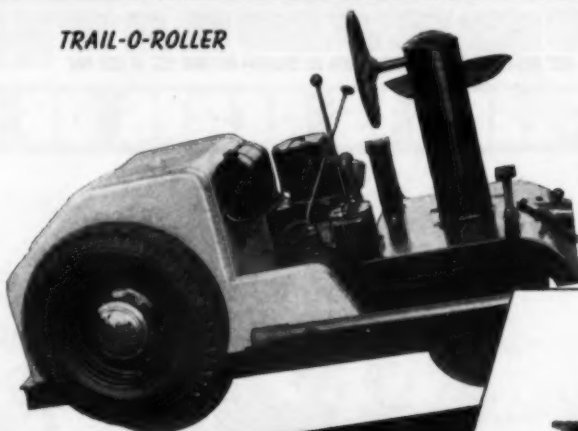
Pan American Airways Photo

An International diesel power plant which supplies electric current at an air field somewhere in Africa.

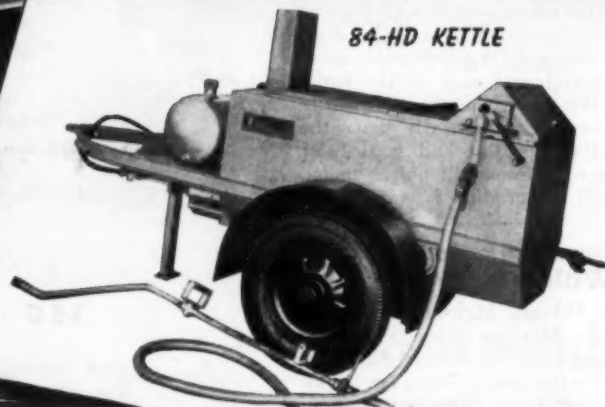
leveling of fields and runway surfacing was done by native laborers working with shovels and head pans. It was not

uncommon to see natives solemnly pick up modern rubber-tired wheelbarrows (Concluded on page 63)

TRAIL-O-ROLLER

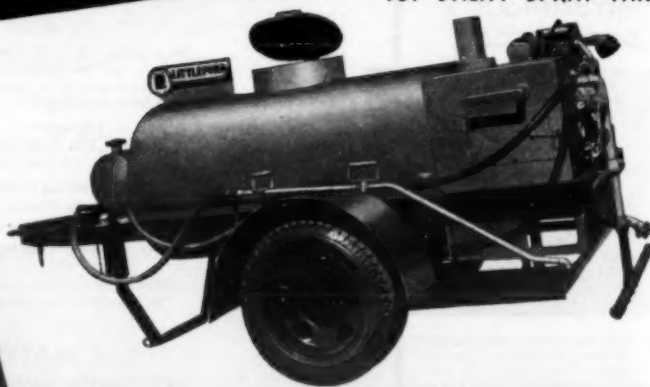


84-HD KETTLE



LITTLEFORD

101 UTILITY SPRAY TANK



TORCH TYPE
OIL BURNER

BLACK TOP ROAD MAINTENANCE EQUIPMENT

The Littleford Trade Mark is in the fight, building and maintaining Airports, Highways, Roads, Barracks and Campments. Doing a job to help bring an early peace. After Victory, the Littleford "Trade Mark" will

again help to make this world a better place in which to live. Littleford, since 1900, has produced Black Top Construction and Maintenance Equipment, and is NOW proud to have the chance to produce for Victory.

Now Is The Time



to put roads and shoulders in good condition for the coming summer's heavy traffic. A BURCH TRUCK-PATROL mounted on a truck you now own will do the job, quickly, economically. Many new and exclusive features including HYDRO-MOTOR control.

Manufactured by

The Burch Corporation

Crestline, Ohio

Burch Equipment Since 1875

Have You Bought Your Quota of War Bonds Today?

LITTLEFORD BROS., INC., 485 E. Pearl St., CINCINNATI, OHIO

New England Offices Of Koppers Co. Moved

Transfer of the New England District Offices of the Koppers Co., Tar and Chemical Division, from Providence, R. I., to the Boston Consolidated Gas Bldg., Boston, Mass., was announced recently. Maurice D. Gill, Vice President of Koppers Co., will remain Manager of the New England District. Local offices will continue to be maintained at the Koppers plants at Everett, Mass.;

East Providence, R. I.; New Haven, Conn.; and Portland, Maine.

The Tar and Chemical Division engages in the sale of road and roofing tars, wood-preserving oils, waterproofing materials, bituminous paints, and other related chemical products.

New Roadmixer Bulletin

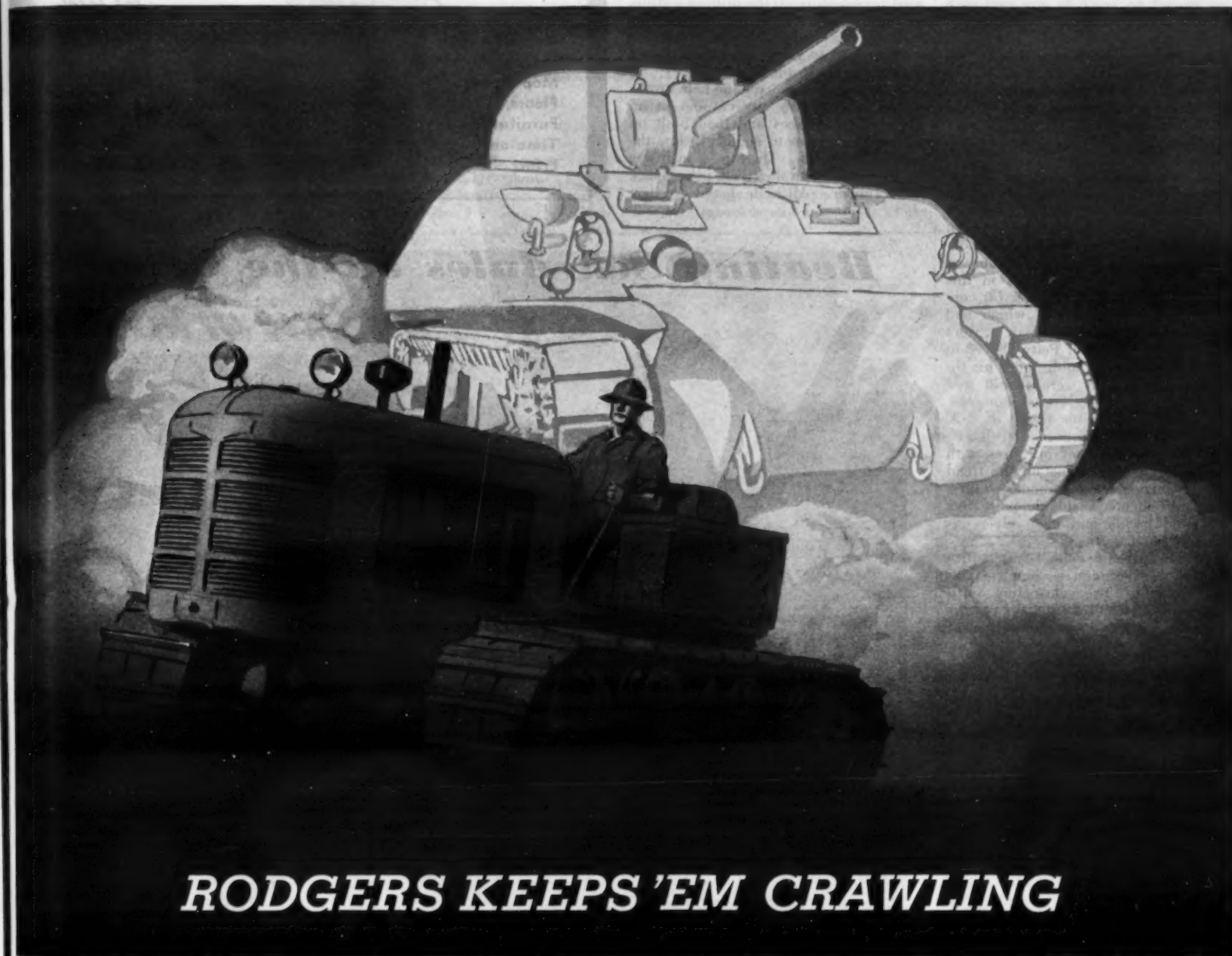
A new bulletin describing and illustrating Wood Roadmixers for fast low-cost paving has recently been issued by

the Wood Mfg. Co., P. O. Box 32, North Hollywood, Calif. The bulletin discusses the traveling-plant method of road and airport construction, describes the features of the Wood machines, explains their operation, and ends with some "Quick Facts" about Wood Roadmixers.

Copies of this bulletin may be secured by interested contractors and engineers direct from the manufacturer by referring to this item, or from this magazine.

New Handy Wall Chart On Expansion Bolts

A broadside, with a return mailing card attached, has just been issued by The Rawlplug Co., Inc., 98 Lafayette St., New York City, in which is described a 14 x 20-inch handy ready-reference expansion bolt and screw anchor dimensional chart. This company offers to send one of these handy wall charts to any expansion-bolts user requesting it on his business letterhead.



RODGERS KEEPS 'EM CRAWLING



Manufacturers of:
UNIVERSAL HYDRAULIC PRESSES
TRACK PRESS EQUIPMENT
HYDRAULIC KEEL BENDERS
HYDROSTATIC TEST UNITS
POWER TRACK WRENCHES
PORTABLE STRAIGHTENERS
FOR KELLY'S AND PIPE

ON THE FAR FLUNG BATTLE FRONTS, on the new Alaskan Highway, or a road construction job anywhere, Rodgers Hydraulics are doing their bit. ★ Wherever crawler type tractors tussle with heavy road building or construction jobs, Rodgers Hydraulic Track Presses furnish speedy repair of vital track equipment. Wherever heavy machinery operates — automotive, construction, factory or power plant — Rodgers Universal Hydraulic Presses will do

a pulling, pushing or lifting job with speed, power, durability and safety. ★ To meet the demands of our times, Rodgers Hydraulic Track Presses are equipped with the Retractable Jaw, the greatest improvement in track servicing equipment — approved and recommended by Engineering and Service Departments of every crawler tractor manufacturer. ★ *If it's a Rodgers, it's the best in Hydraulics.* Rodgers Hydraulic Inc., St. Louis Park, Minneapolis, Minn.

Rodgers HYDRAULIC Inc.

Training of Seabees Complete and Varied

(Continued from page 25)

lines running to eight drums of motor oil. Four of these drums are for non-corrosive lubricants for diesel engines and four are standard SAE motor oils. In addition there is a 400-pound drum of chassis lubricant with a greasing hose long enough to reach to any part of a piece of equipment pulled up near the mobile greasing unit. The truck also carries tools and extra cartridges for oil filters. An auxiliary fuel truck is also maintained with hand-lubricating equipment and extra 25-pound packs of Alemite lubricants.

Rebuilding Tires

The Tire Rebuilding Shop run in connection with the Lubricating School is a truly remarkable institution. Tires that ordinarily would be discarded are put back into service and have given thousands of miles of extra service because of the rebuilding methods taught in this school. For example, 110 tires for construction equipment, all of which had been marked "Beyond Repair", were gone over by the Chief Petty Officer in charge of this school and, under his direction, 28 of them were rebuilt and went back into service for many months. Where the cords on the inside of tires with good treads have broken badly, interliners are made of old tires with the cord intact by cutting off the tread from the outside, leaving about two plies. These are cemented inside the poor tires with good treads and have given remarkably good service.

The Tire Repair School has a tire spreader, a drier, and a complete vulcanizing outfit. The vulcanizing outfit is used not only on tires but for repairs to diving masks or anything else of rubber.

The story of the rebuilding of a 13:00 x 24 grader tire which was damaged by a bad bruise and puncture while operating over frozen ground, breaking the carcass on the inside, is an example of the type of rehabilitation carried on in this shop. Starting on the inside, the carcass was skived with a knife at an angle of 45 degrees to cut out all injured cords. Then it was buffed down to perfect smoothness, cleaned with a rubber

solvent which is almost a benzine, and then painted with rubber cement worked into the fabric with a brush. The tire thus treated was then put into the dry room over night.

On this 8-ply tire, the area skived out was built up, or filled, with cushion gum, an almost pure rubber latex. Then ply stock was carefully laid over the built-up section with its cords crossing at right angles and with one line of cords exactly parallel to the cords of the tire. These cord plies are backed with cushion gum so that they adhere readily to the gum used for building up the injured section. Finally the edges of the ply stock at the ends of the cords were built up with cushion gum to give a smooth edge and prevent injury to the inner tube.

Following this process the hole on the outside of the tire was cut out at an angle of 60 degrees and then built up with cushion gum to slightly below the level of the tread. The top 1/8 inch was built up flush with the tread, using black tread rubber. All high spots were then

(Continued on next page)



GEERPRES

Mop Wringer

In Service for Total Victory

GEERPRES WRINGER INC.

Muskegon, Mich.

Actual Savings in Mop Heads, Floors, Furniture, Time and Effort

Beating Schedules on the Ground ...to beat the Axis in the air!



...with Buckeye Spreaders

THE speed and accuracy of Buckeye Spreaders has helped surface many a runway at schedule-beating pace, extending the network of training, fighting and transport fields that will soon add up to overwhelming air superiority over the Axis.

Fast, accurate and versatile, Buckeye Spreaders deliver the most out of every precious hour, out of every yard of costly, hard-to-get mate-


rial... facts that mean speed and efficiency on essential airport construction and maintenance jobs. Write or wire for complete information.

The Buckeye Traction Ditcher Co.
Findlay • Ohio

PHOTO—Buckeye Spreader laying a chip course over oil base at one of Pan-American's new bases "out yonder".



Unfailing Light FOR THE WORLD AT NIGHT



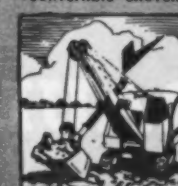





EMBURY AIR PILOT LANTERN

Dependable, streamlined, storm-proof, long-burning—the one lantern that has everything.

Military requirements have first call, but we are striving to meet essential civilian demands. Please anticipate your needs well in advance.

Embury Mfg. Co., Warsaw, N.Y.

Built by Buckeye

Convertible Shovels	Trenchers	Traction Equipment	R-S Finegraders	Road Wideners	Spreaders
					

Class and Field Work In Seabees' Training

(Continued from preceding page)

trimmed off with a knife and the repairs inside and outside as well as the vulcanizer mould treated with powdered soapstone. The air bag was then put inside of the carcass over the section repaired and the tire and air bag inserted in the mould, the bag inflated to the proper pressure, and the whole put into the vulcanizer. The vulcanizer mould was kept at 280 degrees for 1 hour when treating 4 to 6-ply repairs. The temperature is never allowed to vary but the time is varied according to the number of plies being treated. After the vulcanizing was completed and the tire removed, the bag was taken out and the whole tire soapstoned again and allowed to cool for 2 to 3 hours. It was then "almost as good as new" and ready for service.

The Engine School

In Building T15 is located the stationary Gas and Diesel-Engine School. Here the men take down and assemble and check International, Cummins, Caterpillar, General Motors and Buda diesel engines as well as a Waukesha-Hesselman oil engine. Following the final assembly of such an engine it is given a 4-hour test, including checking of the exhaust gases and recording of the power output at various throttle openings. An International diesel engine is set up with direct drive to a 40-kw generator for determining the power output.

The course consists of initial classroom sessions, then careful study of the manual for the engine to be worked on first, followed by disassembling an engine section by section and then assembling it without the manual, followed by the load test. The last week of this course, the men do field service repairs anywhere in the camp just as though they were working on "Island X". The school has a projection room, two classrooms, a tool room, and an office.

Electricity and Generator School

In this school is a wide variety of generators which enable the men to become familiar with the wiring and the various features of each type of generator. There are two 75-kw, one 50-kw, two 10-kw and one each of 5, 3, 2 and 1-kw generators. When the power has been cut off in the section of the camp where the generator school is located, once for as much as 4 hours, the generators were thrown in on the line and supplied the entire training area with power. The men in this school also check all of the wiring that is put into the camp by the contractors and are used as trouble shooters whenever there is a short or a dead line.

A novel scraper for removing mud from shoes, and during the late winter and spring there was plenty of mud at Camp Endicott, was made by the men of the Generator Shop by supporting a piece of runway fabric about 6 feet long and 2 feet wide off the ground on 2 x 4's. The fabric was strong enough to support

the weight of men walking in and out of the shop and all dirt scraped off fell through into a shallow depression below.

The Machine Shop

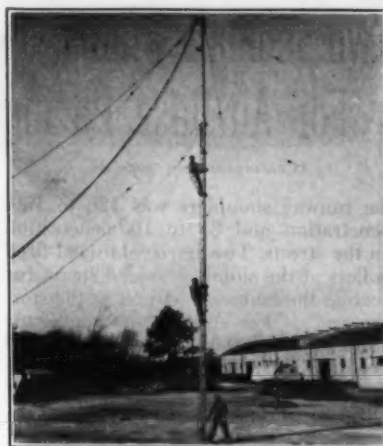
Located in Building T6 is the Machine Shop which is not for instruction purposes but for the repair of field equipment, using men who have finished their training in the various schools. It is equipped with an Ingersoll-Rand Jackbit grinder, two small lathes, a drill press, a shaper, a power grinder and buffer and a power hacksaw. At the time of our visit, drive shafts which had been repaired by building up with a weld bead in T14 were in the shop to be machined down to their required diameters. T6 also houses a complete Tin Shop.

Special Field Equipment

In order that the Seabees in training may be fully conversant with the use and operation, as well as the repair, of a crushing and screening plant, such as would be required for the production of crushed aggregates for concrete, a jaw

crusher has been set up in a small quarry in one section of the camp, complete with a bucket conveyor, screens and bins. It is used to supply the necessary training for the men as well as rock for the camp roads.

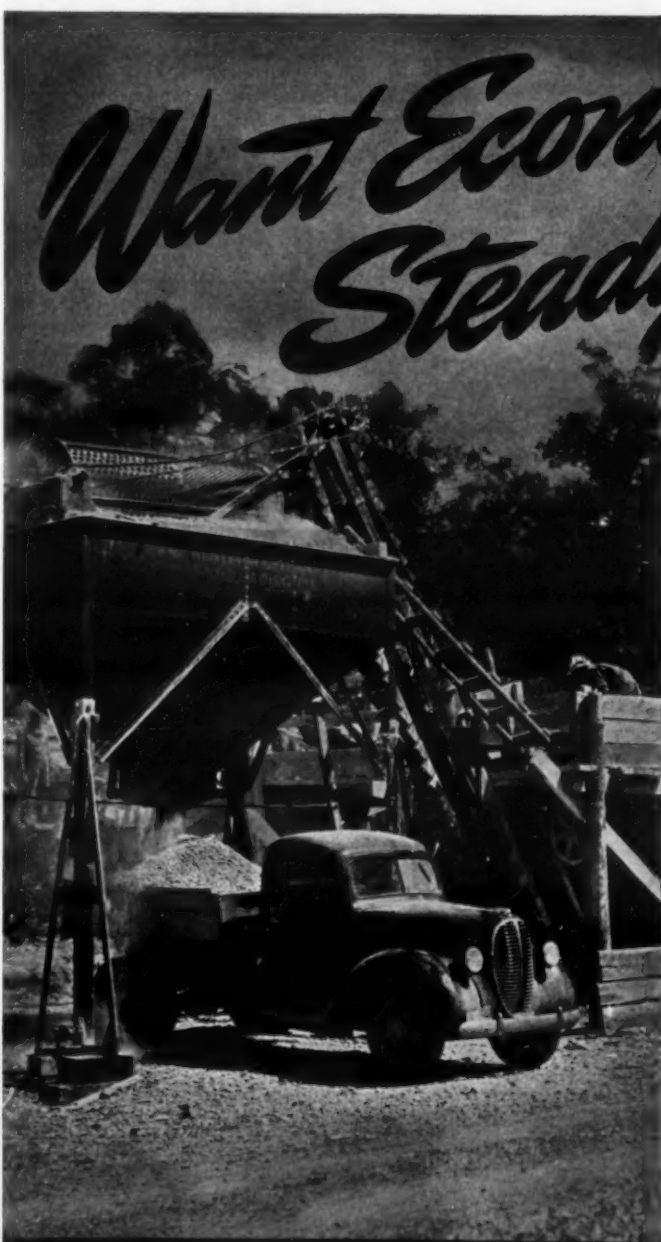
Since instruction in the operation of a power shovel is an important feature of the work, and instruction is very slow when the instructor and the man learning must sit in the same cab and use the same controls, a Northwest shovel was re-rigged in T14 with dual controls. A small addition to the cab provides space for the second set of controls used by the instructor. These two controls can be so interlocked that the operation of the shovel is handled completely by the instructor, with the student learning by holding his levers which, for the time being, follow the movements of the instructor's controls. After the man has learned the function of each lever in this way, the controls are so set that he may operate the shovel but the actual control can be taken away from him by the levers operated by the instructor, if the



Official U. S. Navy Photo
Radio-mast erection by men in the
Tanks and Masts School, Camp Endicott.

trainee makes a mistake.

Practical equipment operation and practice in handling shovels, power graders, scrapers and bulldozers is seen (Concluded on page 59)

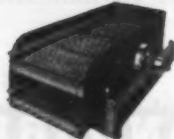
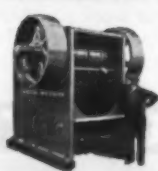


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Austin Western
SINCE 1859

PLANTS LIKE THESE are a "good buy" when you want to keep your investment down; get ample production and make a profit that will not be eaten up by costly upkeep and repairs. They are simple to set up and move around, are especially rugged to withstand wear and tear and they produce stone that meets rigid specifications. . . . At present our manufacturing output is devoted to war use; if our DISTRIBUTORS can cooperate on such work or help keep present equipment in good running order, we know you'll find them accommodating. They have facilities for making satisfactory repairs and carry a stock of repair parts. THE AUSTIN-WESTERN ROAD MACHINERY CO., Aurora, Ill. Distributors in Principal Cities. Cable Address: AWCO, Aurora.



A CEP plant like this can be built with units of varying capacity and size to suit any individual requirement. It consists of a crusher, folding bucket elevator and a heavy power unit mounted on a rigidly braced portable truck.



Individual units to meet a wide variation of requirements are also built by Austin-Western.

SAND'S-STEVEN'S Line & Surface LEVEL



Endorsed and Adopted by Road
Builders and Contractors

Level is easily and quickly attached to line. Special feature construction prevents accidental detachment from line. Construction is sturdy, and accuracy guaranteed.

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8321 Gratiot Ave. Detroit, Mich.

Two Asphalt Plants For Air-Base Paving

(Continued from page 2)

the runway shoulders was 120 to 150-penetration and 85 to 100-penetration on the streets. Two horizontal coal-fired boilers at the siding provided steam for heating the tank cars as well as the storage tanks. For storage, the contractor provided three 20,000-gallon tanks piped to both plants. No pumps were used for the handling of the asphalt; instead steam pressure was used to transfer the asphalt from the cars to storage and from storage to the plants. The siding was ample for holding seven tank cars in reserve, although there were as many as nineteen on hand at one time during the height of the paving. The steam lines were so arranged that four cars could be unloaded at one time through steam-jacketed lines.

The Batch Design

There were several designs for the batches, depending on the character of the work for which they were intended. Also one of the original runway batches was discarded in favor of a new improved type.

Street Base—Type A—T-35 Specification	
Coarse aggregate, 1-inch to 1½-inch	2,815 lbs.
Sand, ¾-inch to 200-mesh	1,900 lbs.
Asphalt, 85 to 100-penetration	285 lbs.
Street Top—Type B—T-35 Specification	
Coarse aggregate, ½-inch to 1½-inch	2,600 lbs.
Sand, ¾-inch to 200-mesh	2,050 lbs.
Asphalt, 85 to 100-penetration	350 lbs.
CAA Runway Base	
Coarse aggregate, ¾-inch to 200-mesh	3,290 lbs.
Sand, ¾-inch to 200-mesh	1,475 lbs.
Asphalt, 85 to 100-penetration	235 lbs.
CAA Runway Top (Used for only a short period)	
Coarse aggregate, 1-inch to 1½-inch	2,200 lbs.
Sand, ¾-inch to 100-mesh	2,475 lbs.
Asphalt, 120 to 150-penetration	325 lbs.
Runway Top—Type B—T-35 Specification	
Coarse aggregate, ½-inch to 1½-inch	2,650 lbs.
Sand, ¾-inch to 100-mesh	2,050 lbs.
Asphalt, 120 to 150-penetration	300 lbs.

The Commercial Plant

The Simplicity System plant was powered by two International diesel engines with a 750-gallon diesel-fuel tank located between them. The aggregates, dumped through the 4-inch square bar grating, were picked up by the cold elevator and delivered to a two-way drier about 15 feet in length and 10 feet in diameter, equipped with a Ray oil burner. The combustion chamber added about 6 feet to the apparent length of the drier. From the drier a Vortex dust collector removed the vapor and dust,

the latter being collected in a dust bin. For compactness the hot elevator was located immediately behind the cold elevator and the latter was completely enclosed.

The hot elevator raised the dry aggregates to a 3-deck vibrating screen at the top of the plant where the gravel and sand were separated into four sizes for the four hot storage bins. The plant was equipped with steam controls for all operations, including the bin gates. The aggregates were weighed out by Kron scales with a separate Kron scale for the asphalt. A battery of four lights at the back of the plant showed when the four top bins were full and, alongside, a Brown Instrument pyrometer provided a permanent record of the temperature of the aggregates in the hot elevator.

The weighed batches were delivered to the double-blade pugmill where they received a 1½-minute mix before being dumped into the waiting batch truck. Automatic control of the plant included an automatic shut-off of the asphalt

valve when the correct amount had been weighed out, and a red light on the mixer platform went on when the pugmill started mixing a batch, went out when the mixing was completed according to specification, and automatically dumped the batch.

The Assembled Plant

The aggregates were delivered to the assembled plant in the same manner as to the plant first described. This plant had electric drive and electric control throughout. The single-pass drier had the cold elevator at one end and the hot elevator at the other, and was equipped with a Vortex dust collector and blower for the removal of the vapors from the drier. The drier was 27 feet long and 8 feet in diameter, driven by a Westinghouse motor through a chain drive located immediately beneath the drier. Other Westinghouse motors were provided with either chain, direct or V-belt drive for the other driven parts of the plant.

At the batching platform the aggre-

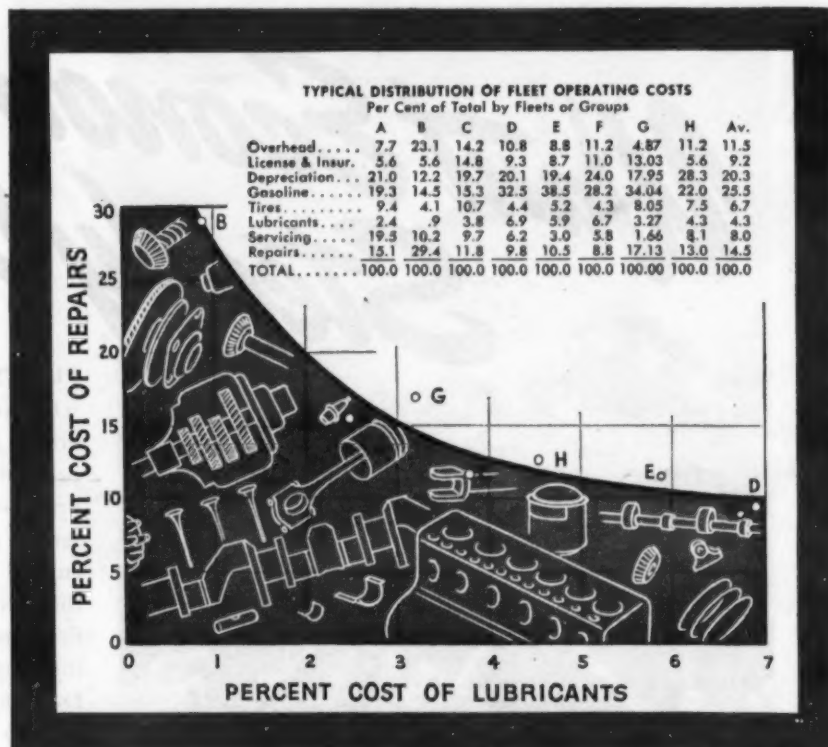
gates were weighed out from the bins beneath the single-deck vibrating screen by hydraulic controls, with similar control for the asphalt, while the batch was dropped from the pugmill by manual control direct. Toledo scales were used for weighing the aggregates and the asphalt.

At the entrance to the plants there was a fuel-oil spray unit for use by the truck drivers to spray the truck bodies on alternate trips.

Laying the Hot-Mix

The maximum haul from the plants was about 1½ miles to the runways while the average haul for both runways and street paving was about ¾ mile. For street paving the binder course was originally 1½ inches with a 1-inch top but this was changed, to insure a smoother surface, to a 1-inch binder course and 1½-inch top. The roadway foundation consisted of from 4 to 6 inches of waterbound macadam in widths of 20, 22 and 24 feet with a short sec-

(Concluded on next page)



KEY

- A—Oil Co. Survey of Several Fleets, Av.
- B—Large Public Utility Fleet
- C—Scattered Fleet of 400 Vehicles
- D—Scattered Fleet of 300 Coupes
- E—Scattered Fleet of 450 Cars
- F—Fleet of 300 Half-Ton Pickups
- G—Autocar Company's Report (Adjusted)
- H—"Composite" Iowa Automobile Costs

How to save scarce parts and labor

• GRAPHIC EVIDENCE that scarce parts and labor can be saved by good lubricants is given in the chart above. It represents the experience of many fleets, as shown by the table. Note that in practically all instances, fleets that spent more for lubricants had lower repair expense—also a much lower total of lubricants plus repair costs than the other fleets.

That was important, even in normal times. But today, with repair parts and labor both hard to get, the cost of lubricants is even less important. The only question is, "How much will it save on maintenance?"

Doesn't that suggest the first step to take in your preventive maintenance

plan? Find out exactly what your costs are for repairs and for lubricants. Then work toward adopting lubricants that will lower the total of both.

Here's how a Standard Oil Man can help you. He can recommend lubricants that will help reduce wheel bearing maintenance and chassis repairs, or motor oils that will eliminate troublesome varnish and engine deposits. From his experience with these products on other fleets, he can help you save both scarce parts and labor. Call any local Standard Oil (Indiana) office, or write 910 S. Michigan Ave., Chicago, Ill. In Nebraska, call any Standard Oil Company of Nebraska office.

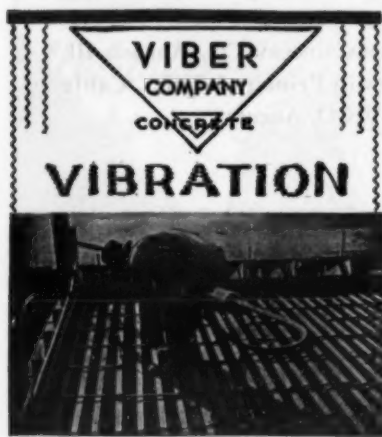
Start saving with one of these detergent-type oxidation-inhibited motor oils.

Stanolube H. D. This heavy-duty oil for gasoline and Diesel engines is available only to the U. S. Government and fleet operators. It represents our most advanced development in an oxidation-inhibited, detergent-type oil for protection against varnish, engine deposits, and the resultant overhaul and maintenance expense.

Standard Bus and Truck Oil. Designed for moderately heavy-duty service in gasoline or Diesel-powered trucks and buses where its detergency and oxidation-inhibited quality assures cleaner engine operation than can be obtained with conventional type motor oils.

A Standard Oil representative can advise you which of these war-duty oils is best fitted for your equipment.

Oil is ammunition . . . Use it wisely



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When the job calls for mass vibration—the Viber Vibrator at work above is your best bet. Especially made for walls over 10 inches thick, foundations, large girders, thick floor slabs, columns . . . large reinforced concrete bridges, grade separations, concrete floor systems, concrete arches and rigid frame structures . . . In a word, for all concrete with large aggregate and low water-cement ratio.

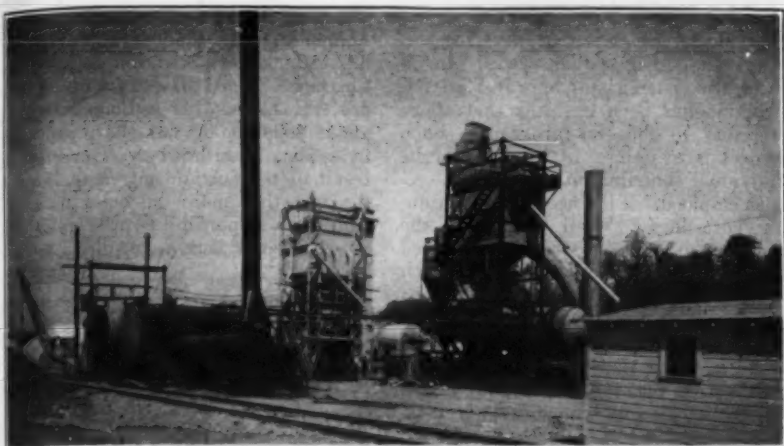
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U.S. Army Signal Corps Photo
The two asphalt plants which turned out 3,055 tons of hot-mix for runway paving in 18 hours at a Midwest Air Base.

Runways and Streets Paved with Hot-Mix

(Continued from preceding page)

tion 36 feet in width. This was compacted by steel-wheel rolling under an earlier contract and then primed by the paving contractor with 0.35 gallon per square yard of MC-1, using the contractor's own Etnyre distributor.

All of the street paving was laid by two Barber-Greene spreading-tamping-finishingers operating with a variable width of 9 to 12 feet. The trucks hauled 7½ tons per load, or three batches, and, even with all of the trucks that could be handled through the streets of the base, the spreader was always waiting for more material. Each truck load provided about one hopper full for the machine and before the next truck could back into place the two conveyors in the bottom of the hopper had carried the material out to the rear under the spreader and tamping and the machine had to stop for the next load. The spreader traveled at 25 feet per minute on street paving. When working around curves in the street paving, the confining plate just in front of the tamping was removed on the outside to permit the release of additional material.

The paving crew consisted of the spreader operator, two wing men, three rakers, three or four shovelers, the operator of the Galion 8-ton tandem roller on breakdown, and the operator of the

10-ton Galion tandem used for finish rolling. The same organization was used on the runway paving.

The runway binder course was first

specified as 2½ inches with a 1½-inch top but this was later changed to a 3-inch binder course and a 1-inch top. The soil-stabilized base of the runways was primed with 0.4 gallon of RT-2 ahead of the laying of the binder. Near the end of the work it was decided to apply a sand seal to all the runways for better wearing qualities and also to provide a uniform surface throughout where the change had been made from the old CAA top to the new specification. The runways were given a shot of 0.2 gallon per square yard of AE-3 emulsified asphalt and then covered with 10 pounds of lake sand of ¼-inch to 200-mesh screen size per square yard.

Personnel

The asphalt paving at this Army Air Base was done under a subcontract with the general contractor for the Base, under the direction of the U. S. Engineer Department. The hauling of the asphalt batches was also done under a separate subcontract.

WILLIAMS Buckets



WELDED ROLLED STEEL CONSTRUCTION

eliminates cumbersome dead weight and insures a stronger bucket that will wear longer with less breakage and less cost for maintenance.

This welded design which has made Williams Buckets so universally used in steel mill service is now featured in all

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BUILT TO LAST AND
MOVE DIRT FAST



Built by **WELLMAN**

THE MOST IMPORTANT UNIT FOR AIRPORT RUNWAY CONSTRUCTION



Wherever there is mixed-in-place construction such as soil-cement, bituminous, etc.



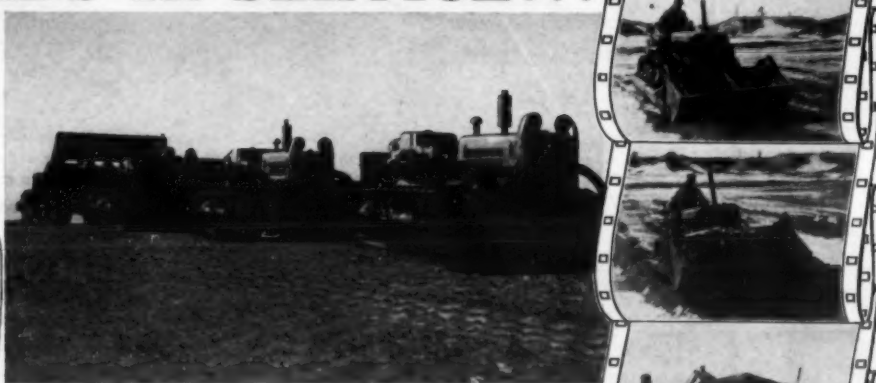
IT DOES THE JOB THOROUGHLY, RAPIDLY, AND ECONOMICALLY

The AGGMIXER operates with other general purpose road equipment—from power take-off shaft of any suitable tractor—easy and safe to operate. The swirling chopping action of the AGGMIXER tines does a thorough job of mixing—wet or dry. Illustrations above show use on airport runway construction. Send for job facts now.

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BRILLION, WISCONSIN**

HUNDREDS IN SERVICE...

Drott Bull Clam Shovel



Hundreds of Drott Bull Clam Shovels are "doing their stuff" at home and on the front lines...all the way from burying garbage at service camps to throwing up barricades, filling-in bomb-craters, busting trails and roads through the jungle in out-of-the-way places for the Armed Forces, constructing airports! Handle the work of many units—bulldozers, scrapers, shovels, graders, clams, tampers, hoists, snow plows, etc. Dig, carry or float, backfill or load material...uproot and haul trees, boulders and debris! Countless diversified uses. Fit current model crawler tractors. Wire, write or call for full information.

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Picking up load, pushing it mud boat fashion and dumping it.

- Hydraulically controlled from operator's seat.
- Up to 3' lift above ground—one foot below.
- One to four yards heaped capacity...three to twelve thousand pounds lift capacity.
- Raising and lowering of front clam controls cut.
- Regular bucket interchangeable with special snow bucket.





A Hunter-Hartman portable gasoline-engine-driven generator.

Portable Generator For Battery Charging

A new portable gasoline-driven generator for rapid battery charging, making it possible to take the charger to the point where large batteries must be charged and where conventional equipment for charging is not conveniently available, has been announced by Hunter-Hartman Corp., St. Louis, Mo. The equipment is designed to charge 6, 12 and 24-volt batteries at 10 to 300 amperes, and consists of a specially designed generator driven by a 6-hp single-cylinder air-cooled gasoline engine which is equipped with an air cleaner, gasoline filter, magneto, self starter, rope starter, gas tank and remote stop control.

The entire unit is mounted on a skid-type base, equipped with 5-inch wheels. When the unit is in use the wheels are raised from the ground, to prevent creeping. The unit may also be used, according to the manufacturer, as a direct lighting plant with an output range from 1,000 to 3,000 volts as required.

Deliveries can be made with reasonable promptness, and information will be supplied to those inquiring direct to the manufacturer and mentioning this item.

Halt in Construction An Aid to War Effort

In curtailing less essential construction, the War Production Board reports that it has sought to divert into channels which will contribute directly to winning

the war the vast amounts of materials and labor which otherwise would have been expended in a large public and private construction program. If these non-military and non-essential construction projects had not been halted, WPB says, the aggregate demand for materials, labor, transportation, manpower, and technical and engineering services would have been so great as not only to jeopardize the various military and essential civilian production programs, but also to have forced the most essential war projects dangerously behind schedule. These latter are the rubber program, the high-octane gasoline program, the aluminum and steel expansion programs, the aviation program, and similar programs of critical essentiality.

Responsibility for curtailing construction was placed last October in the hands of a Facility Clearance Board and the Facility Review Committee. Among the types of projects which have been ordered deferred until after the war are highways, water works, sewage plants, housing, hospitals, schools, office build-

ings, flood control, river and harbor improvements, irrigation projects, recreational and other similar works. In all cases, the criterion for approval of construction has been basically that of essentiality to the war program. Each project is examined in the light of its individual contribution.

In emphasizing the need for a continuing curtailment, WPB pointed to the drain on the country's resources caused by the 1942 construction program which at times occupied nearly 3,000,000 men; consumed approximately 13,000,000 tons of cast iron and steel in the form of finished products, which meant 18,000,000 tons of pig and ingot; about 180,000,000 barrels of cement; nearly 160,000 short tons of copper in finished products; nearly 190,000 short tons of lead; nearly 75,000 short tons of zinc; and more than 21,000,000,000 board-feet of lumber.

Already the Facility Review Committee has revoked priority assistance to less essential construction projects having a total value of \$1,325,545,454 and

has disapproved new projects having an estimated total value of approximately \$22,450,000. In addition, the Facility Clearance Board has disapproved new projects having an estimated cost of about \$63,000,000. A sharp reduction in applications, however, is partly the result of the curtailment campaign and the fact that many agencies now recognize the responsibility of keeping non-essential construction curtailed.

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HUBER BULLDOZER

SPEED SCOOPS • ROLLERS

One of these days airports will be available sufficiently close to Japan so the full might of the Allied air force will be felt where it hurts most. Huber Bulldozers, Rollers and Speed Scoops will be there, too, keeping these airports in condition, regardless of the odds, so the enemy can be blasted off the map... and Pearl Harbor truly avenged. It is the one job Huber equipment and the men who build it are looking forward to with genuine pleasure.

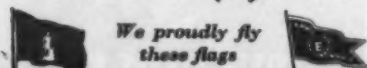
THE HUBER MFG. CO., Marion, Ohio

HOISTS

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GASOLINE • DIESEL
AND
BELT DRIVEN

- FOR OVER 69 YEARS WE HAVE BEEN BUILDING FINE HOISTING MACHINERY
- OUR DUPLICATE PART SYSTEM INSURES PROPER FIT OF OUR FACTORY BUILT REPLACEMENTS
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We can help you!



THE LUBRIZOL CORPORATION
MANUFACTURING COMPANY
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Construction Equipment Must Be Fully Utilized

In Spite of High Output of Industry, Demand for Equipment Is Mounting; Put Your Idle Machines to Work

THE necessity for putting into use all construction machinery now standing idle throughout the country was stressed recently by officials of the War Production Board's Construction Machinery Division. According to reports from WPB regional offices, lack of full utilization is seriously hampering the war effort. The demand for construction equipment, both new and used, far outstrips the supply, in spite of the fact that the industry is currently producing at the rate of approximately \$1,000,000,000 a year.

Although construction is declining, the demand for almost every kind of construction equipment is mounting, due to the use of many construction machines in other fields of activity. This has increased (in the case of crawler tractors as much as 188 per cent) due to the use of construction equipment in actual battle areas, to the tempo of war work, and the growing man-power shortages which are placing heavier demands on machinery.

The average nine months' backlog of unfilled orders for six critical types of new equipment emphasizes the urgency of full utilization of used equipment. Practically the entire output of new construction machinery goes to the armed forces, the Construction Machinery Division points out, citing as an example the allocation in 1942 of 85 per cent of new crawler tractors directly to the military. Almost all new equipment not assigned to the armed forces is used to fulfill contracts for the military services. New equipment is sent overseas in preference to used equipment, in order to reduce maintenance and repair work and provide uninterrupted service in situations where lives are at stake.

On the home front, used equipment must therefore do the work, and the WPB is intensifying its drive to get all idle equipment into active service. The program was launched in the autumn of 1942 with the issuance of an order (L-196) requiring the registration of all used construction machinery in WPB regional offices. A construction machinery specialist in each of these offices works with WPB officials in Washington to maintain a perpetual inventory of used equipment and its service status, and to supply needed equipment from the idle pool.

Approximately 350,000 items have been registered. Greater utilization of these machines must be obtained and redistribution of the more critical ones must be effected through rental or sale, the Division points out, before military and essential civilian needs can be met.

Contractors are being urged to release equipment they no longer need, as soon as they finish a contract. It is pointed out that a well-functioning distribution of idle equipment will be of benefit to all. The contractor who today is unwilling to release his equipment in case

he gets another job in a few months may find that his present equipment won't be sufficient to handle that job anyway. The WPB points out that with a pool of idle equipment, including his own, to draw on, he as well as other contractors will be able to get the necessary equipment and finish the job on schedule.

Fibre Hat for Safety Has Added Protection

A new bulletin on Strauss vulcanized-fibre helmets, which are available with a laced-in lining or with a lining carrying a replaceable head band, calls attention to the new added protection

furnished by a detachable rain cape of fabricoid or an earmuff.

Bulletin 143 describes the Strauss Head Protector helmet and gives full details. Copies may be secured by writing direct to The Strauss Co., 925 Liberty Ave., Pittsburgh, Pa., and mentioning this item.

A SUPER FRAME FOR A SUPER TRAILER!



Here's a trailer frame that isn't going to sag. It is extra heavy and well braced. Beams are deep and have wide flanges and more cross members are used for rigidity. It gives you strength without added weight.

Jahn Trailers have built up an enviable reputation for load carrying ability and freedom from

frame troubles. This can easily be checked by contacting the hundreds of Jahn Trailer owners throughout the country.

You probably are making plans for the future. Let us send you the new Jahn Trailer Catalog to help you.

C. R. JAHN COMPANY • 1347 W. 37th Pl. • Chicago

Any Axle
or
Wheel
Combination



"COME TO TRAILER HEADQUARTERS"



You Bet - I'm Busy!
but not too busy to
keep my equipment
in A-1 shape!



With new machines and replacement parts hard to get, it's practical patriotism, as well as good business, to adopt a regular schedule of inspection, lubrication and maintenance of your present equipment. . . . Keep your MICHIGAN Mobile CRANES in shape to carry on under war-time pressure.

CHECK THESE VITAL POINTS REGULARLY:

- ✓ **Power Take-Off:** Inspect housing weekly for proper oil level. Use SAE No. 250 in summer; SAE No. 140 in winter.
- ✓ **Hoist, Crowd, Intermediate and Swing Shafts:** Remove and repack bearing retainers every six months. When machine is worked longer than normal hours, repack retainers more frequently.
- ✓ **Boom Point Sheave Bushings:** Grease daily through high-pressure fittings. Inspect sheave flanges for wear. Sheaves in good condition will contribute to longer cable life.
- ✓ **Cables:** Inspect regularly for wear. Apply lubricant by brush as required.
- ✓ **Main Drive Chain:** To eliminate chain slap, add shims under hoist shaft support brackets.
- ✓ **Clutches (Hoist, Crowd, Swing):** To adjust, remove cotter keys and tighten the three nuts located on extreme diameters of clutches to an even, snug pressure. Back nuts off five notches and replace cotter keys.

Our engineering staff is ready to offer its services in helping you solve your lubrication and maintenance problems. Write today . . . Ask for Bulletin CE-53.

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Model T6-K Michigan Mobile Shovel-Crane, 3/4 yard capacity. Convertible to standard front-end attachments.



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COMMERCIAL HEAT TREATING
SEASONING OF STEEL
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What Are Road Needs For Post-War Period?

(Continued from page 39)

flow of traffic in and around a city, the planning engineer has great influence on future urban developments and directional expansion. Since business and residential areas often move toward a new by-pass route, influencing the entire aspect of the city, foresighted planning and ample zoning protection are essential to control future development. When a by-pass route is decided upon, it may be combined with the city park system and eventually be developed into a Greenbelt which permits only limited access of local streets to the through highway.

We recommend to all highway engineers and city planners a careful study of "Urban Highway Routes and Parking Facilities", Bulletin No. 10, published by the Texas Highway Department, Landscape Division, January 1, 1942.

Long-Haul Super-Highways

There is definitely a need for some super-highways on our inter-regional system. For example, in the North Atlantic states there exists a great inter-regional bottleneck from Boston to Washington, the longest heavy-traffic route in the world. Here is a need for an inter-regional super-highway which might eventually become a link in a Maine-to-Florida motorway, as traffic along this route from Canada to the Gulf amply justifies such a highway.

The great Pennsylvania Turnpike had already proved its worth as a commercial facility before the war, and has taken on increasing importance with the expansion of Midwest industries as an important part of the Arsenal of Democracy. There is need for the extension of this Turnpike westward through Pittsburgh to Cleveland, Detroit and Chicago, and eastward to Philadelphia, joining the Boston-to-Washington super-highway mentioned above.

These are but two examples of necessary super-highways which, as free roads or even as toll roads, will justify their construction through savings in time, material, wear and tear on motor vehicles, and human life. Other locations may well be found throughout the coun-

try where the traffic needs can be best served by the construction of similar traffic facilities on the inter-regional system. Such new super-highways should strike out boldly on new locations to provide as nearly as possible the ideals of the highway engineer in construction costs and methods, maintenance and roadside development. These highways should not by-pass cities but should plunge through the hearts of our great industrial centers, carrying traffic essential to them without congestion, and removing the traffic that will travel on.

The financing of these super-highways may either be included as part of our Federal-Aid construction, or they may be financed by tolls collected solely for construction, as on the Merritt Parkway in Connecticut, or separate Authorities may be created for the construction of a toll road, issuing bonds which will be self-liquidating, as in the case of the Pennsylvania Turnpike. Inasmuch as inter-regional super-highways are a distinct asset to the entire country, we believe that they should be financed by Federal-Aid as free roads. There is no objection, however, to charging small tolls, as on the Merritt Parkway, on completed sections in order to provide the construction funds for extension of the facility. In this case, maintenance funds are provided by the state.

In many states, statutes affecting highway work are hang-overs from the horse-and-buggy days and prevent the acquisition of adequate rights-of-way for super-highways, while in others limited-access facilities are unattainable without special legislation. The Public Roads Administration has prepared a model limited-access highway law, copies of which are being distributed to state highway departments, so that proper legislative action may be taken promptly to clear the way for future construction of this type of highway. States legally prepared to construct limited-access highways are California, Colorado, Connecticut, Louisiana, Maine, Maryland, Michigan, New Hampshire, New York, Ohio, Rhode Island, Virginia and West Virginia. Arizona, Delaware, Massachusetts, Missouri, New Jersey, New Mexico and Utah have such legislation under consideration.

County Programs

A great volume of county highway planning is needed for the hundreds of thousands of miles serving the rural areas. Many of these routes are the feeders to the state farm-to-market roads.

In general, counties are suffering from loss of man-power to an even greater degree than state highway departments. In the county, the loss of two men from its drafting room may mean that its entire design personnel is wiped out. Under these conditions, planning for post-war work is difficult. But County Commissioners should do all in their power to prepare a program based on local needs, even though lacking the personnel capable of transferring it to design, plans and specifications.

Highways are economic units, the expense of which must be justified by the volume of traffic carried. There cannot be a surfaced road to every remote farm gate. One of the problems for the 2,700 county highway departments in this country, responsible for the great mileage of rural roads, is to review all of the feeder roads, measuring them objectively by scientific criteria which planning surveys have made available, and to select for systematic improvement those which, by the value of their present or potential service, merit the

necessary expenditure.

Glynn County, Ga., is an example of a well-managed county with a flexible program which can be put into effect over a shorter or longer period of time, depending on economic and local conditions. This program, initiated in June, 1942, is now largely suspended except on those county highways serving military areas, but stands ready for the post-war period, to serve the employment needs of the country, and can be expanded to keep pace with the county's development. For a considerable period of time, Glynn County has been accumulating a financial reserve to be used in large measure for this proposed program. As of December 31, 1942, their current assets included \$137,401 in cash and \$25,232 in State Highway Refunding Certificates due March, 1943. Reserves consisted of U. S. bonds purchased at a cost of \$108,165, with a maturity value of \$146,000, and State Highway Refunding Certificates maturing 1944-45, having a value of \$51,222.

(Continued on next page)



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Suggested Financing For Needed Road Work

(Continued from preceding page)

With the necessary curtailment of capital expenditures because of the war, their reserve is increasing. If Federal funds are available for post-war highway work, Glynn County's funds will serve as a pro-rata contribution, thereby increasing the construction program. Examples of the solution of county highway problems are the Davison Highway, constructed by Wayne County, Mich., as a war project, although it was designed before the start of the war, (C.&E.M., March, 1943, page 18), and recently completed dual-lane war projects in Franklin County, Ohio, (C.&E.M., April, 1943, page 21). Similar projects for urban areas requiring them should be a part of such counties' post-war planning program.

Financing

The needed highway work essential to maintain the balance of highway construction at the proper level in the post-war period, estimated by Charles M. Upham, Engineer-Director, American Road Builders' Association, to amount to \$3,000,000,000, will require vastly greater sums than ever before expended on a highway construction program. To achieve this, there must be a wider spread of Federal-Aid. In view of the amount of the Federal motor-vehicle and gasoline taxes collected in normal times, which have always greatly exceeded the amount of Federal-Aid, and considering the flow of funds back into the Federal treasury as a result of the maintenance of the proper level of employment, such an increased Federal-Aid appropriation to make possible a \$3,000,000,000 highway program seems amply justified. Lack of plans for a highway program expanded to meet the employment needs of the depression years 1933 and 1934 led to the creation of WPA and the whole "made-work" program. To avoid a repetition of this, state highway departments are concentrating now on the plans for useful highway projects for the post-war period, but these plans cannot be translated into projects unless equal foresight has gone into the preparations for financing them.

Federal-Aid for state highway construction has a long and honorable history under the able administration of the Bureau of Public Roads and the Public Roads Administration. The few adequately organized state highway departments in 1916 have now increased to 48, and we have a well-coordinated system of state and Federal highways. The Federal-Aid program should be expanded, under the supervision of the Public Roads Administration, to include county roads and city streets and thus strengthen these highway departments and the systems of highways and streets under their jurisdiction in the same manner in which the state highway departments were aided in their advance from mediocrity to the efficient organizations they are today. Such a program should supplement the expenditures of county and city funds available and should be based on

50-50 matched Federal-Aid, or loans.

A considerable portion of the 2,700 counties with highway departments have active efficient highway organizations comparable in character to state highway departments, though smaller. To these counties, Federal-Aid could be given direct, while in the case of the remaining counties, it could be administered indirectly through the state highway departments until such time as these counties develop strong administrative units. Where the size or financial status of a single county is such that it would be ineligible for direct Federal-Aid to counties, state legislation should be enacted to enable several counties to create a joint highway department to serve the needs of all member counties in the expenditure of Federal-Aid funds. In the New England states, the townships would be the intermediate highway construction units, as they, rather than the counties, now do such highway work. In Massachusetts agreements already exist between the towns and state covering the

(Concluded on page 60)

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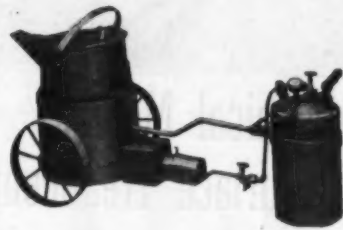


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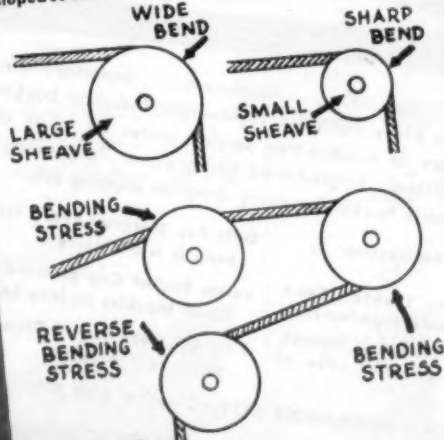
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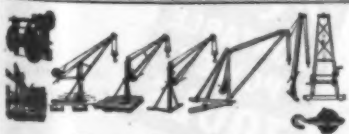
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C. & E. M. Photos
1942 and 1943 methods of spreading sand for surface treatment in New Hampshire. The spinner was used to cover half the highway in 1942, while a windrow down the center is being used this year.

Economical Methods Of Surface Treatment

(Continued from page 23)

Co. with its four distributors for one-half the width of the road. As rapidly as possible this was covered with pit-run sand at the rate of 25 pounds per square yard. The fleet of trucks was kept running from the nearest pit to the area being sanded, the operation being started at the farthest point on the road from the sand pit so that there was a minimum of traffic over the section of road being processed after the application of the tar and sand. Two laborers with shovels climbed into each loaded truck as it arrived to push the sand down toward the gate in the back of the truck through which it was delivered to the spinner device which spread the sand over the freshly tarred area. A special tail-gate was used on these trucks. Above the usual tail-gate was a hinged section which was raised as the truck body was raised for dumping so that the sand would not pour over the top of the standard tail-gate. Two angle-iron stanchions were bolted to this tail-gate so that when it was raised they were high in the air and had a chain between them which the men could grab if there was any condition which might throw them out of the back of the truck and cause an injury.

Immediately following the spreading of the sand, which is not very uniform if the sand is damp, it was moved across the half section of roadway by a pair of Wehr power graders equipped with pneumatic tires. This caused the sand to act as a blotter over the entire area. As soon as both halves of the roadway had been so treated and the graders had picked up the material to a center windrow, they then spread it uniformly across the road. This operation was followed at once by a careful systematic honing of the material by the group of trucks equipped with Burch Undr-Truk maintainers which were adjusted accurately by means of a Power-Packer hydraulic pump. This honing operation is comparable to road-mixing except that there is such a small amount of material being manipulated. As the material was moved across the road the first time by the power graders it showed little mixing, but as the hones operated, the sand took on a uniform black color from the tar as the individual grains were

coated with the bituminous material. The Burch maintainers had a pair of blades at the front which gathered the material toward the center of the body of the truck, a short inverted V blade spread the material, and it was then caught up again by another pair of blades similar to the first pair and spilled back against a pivoted spreader bar at the rear of the machine immediately below and in sight of the hone operator who sat at the left of the rear end of the hone. By means of the pivoted spreader bar, the material could be moved to the left or to the right or spread uniformly across the 10-foot section being worked by the hone. The hones operated at a speed of from 9 to 10 miles per hour.

Immediately following the completion of the honing operation, and sometimes during this work, a special Huntley rake about 10 feet in length was pulled behind a truck at an angle. This rake was equipped with spring steel

teeth slightly curved and about 10 inches long. By means of this rake, gravel larger than the size desired on the road, a maximum of 1 inch, was thrown to the side. Adjacent to private property the truck was operated at a slow speed and the gravel left in a loose windrow at the side of the road while in rural sections the truck was operated at a slightly higher speed and the gravel thrown out on to the shoulder. The final operation was a thorough rolling of the surface by single-wheel rollers pulled by trucks. These are made up in the state shops from discarded power rollers and are equipped so that they may be pulled in either direction, making it unnecessary to turn the 2½-ton roller on the road.

An interesting bit of "Public Relations" called "back-sanding" was done by the maintenance crew usually just ahead of rolling. Sand was applied by one of the spinner devices at the rate of about 10 yards per mile as a light cover over the hone-mixed surface to prevent any picking up of the surface by traffic. As a matter of fact, this material which has between 5 and 6 per cent bitumen in it does not pick up under traffic but the 10 yards per mile was a good investment as it made the public feel that it was being protected.

Costs

The cost of this operation in Division 8, according to the maintenance report, for the period from February 1, 1941, to January 31, 1942, was \$346.49 per mile, which is slightly higher than previous years because in that fiscal year the amount of roadway surface-treated was unusually small.

The minimum cost per mile for surface treatment on the trunk-line system in 1942 was \$418.55 and the maxi-

mum, \$624.16, the lowest being in the southern part of the state and the highest in the northern section. This variation results largely from the difference in the price of tar and greater difficulties of operation. The 1942 price for tar exceeded that for 1941 by approximately 1½ cents a gallon. This, which represents about \$80.00 a mile, plus an increased cost of approximately (Concluded on next page)

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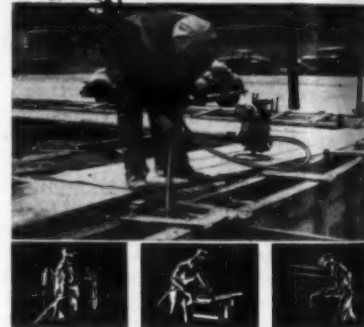
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New Hampshire Changes Maintenance Methods

(Continued from preceding page)

20 per cent for labor and equipment, explains part of the difference between the total cost of this operation for 1942 as against 1941.

1943 Procedure

Last year, a new method of bituminous surface treatment was developed by A. E. White, Division Engineer, Keene, N. H., which will be standard practice for this type of work on New Hampshire's highways in 1943. The preliminary operations are the same, the variation being in the application of the tar and aggregate.

Under 1943 procedure, State specification T-5 tar having a specific viscosity of 20 at 50 degrees C is applied at the rate of 0.2 gallon per square yard for a 3 or 4-foot width along the center of the pavement. The width of the application is determined by the width of the pavement, 3 feet for pavements 20 feet or less in width and 4 feet for wider pavements. Following the application of the tar, a windrow of pit-run sand or gravel is placed on this strip in an amount sufficient to cover the full width of the pavement when bituminous-treated. The trucks have an opening 10 or 12 inches wide cut in their tail-gates through which the aggregate is fed to make the windrow. Marks chalked on the pavement edge or scratched on the shoulder, after pace measurements have been made, indicate the space into which one 3-cubic yard truckload is to be windrowed, on the basis of 80 cubic yards per mile for a 20-foot pavement. The number of trucks used depends upon the length of haul, but is usually between 20 and 30.

A crew of two men usually unloads four trucks, and this unloading crew has their number of trucks definitely assigned to them, with the truck drivers instructed to continue along the road until they find the men to whom they are assigned. The loading of the trucks is so arranged that one truck for each unloading crew goes out in proper sequence, to prevent bunching of trucks waiting to be unloaded on the road.

It is sometimes necessary for a grader to trim the windrow of sand so that it is uniformly placed on the tar strip in the center of the pavement. This work is spread out for from 4 to 8 miles ahead of the treatment, to prevent the sand truck, distributor, rakes and hone trucks from getting in each other's way.

The next step is the application of tar from the edge of the strip, previously spread through the middle, to the outer edge of the pavement. A power grader follows about 150 feet in back of the tar distributor, splitting the windrow in half and spreading the aggregate onto the tar. When one side of the highway has been covered, the operation is repeated on the opposite side. Then follows the raking, honing and rolling which are the same as in the procedure described for 1941 and 1942 practice.

Resurfacing Concrete

A considerable mileage of old concrete in New Hampshire has been resurfaced with a tar treatment. A tack coat of $\frac{1}{8}$ gallon per square yard of tar with a specific viscosity of 20 at 40 degrees C is applied to the surface of the concrete and immediately covered with fine sand. Two weeks later 0.2 gallon per square yard of tar with a specific viscosity of 20 at 50 degrees C is applied and covered with sand or fine gravel, the Huntley rake is pulled over it to remove all stone over $\frac{1}{2}$ -inch screen size, then the surface is honed with the Burch Under-Truk maintainer and is rolled in the same manner as the regular surface treatments of the tar surface-treated roads described above.

Personnel

Frederic E. Everett is Commissioner of the New Hampshire State Highway Department, with LeRoy F. Johnson as Maintenance Engineer. Maintenance operations in the various divisions are directly under the supervision of the Division Engineers who are allowed considerable latitude in details of handling resurfacing operations, but are quick to adopt methods which have proved satisfactory in other divisions.

New Floodlight Unit For Construction Jobs

A new floodlight, employing a standard 200-watt incandescent bulb, with a silver-mirrored glass Permaflexor, has recently been announced by the Pittsburgh Reflector Co., Oliver Bldg., Pittsburgh, Penna., for use on power shovels, cranes, trucks, or floodlighting towers on construction jobs or for fixed locations in shops and equipment yards.

It is stated that this new floodlight is shock-resistant and completely weather-proofed. The Permaflexor is located in a corrosion-resistant sheet steel housing, with a convex heat-resisting $\frac{3}{8}$ -inch glass cover, equipped with a removable lens frame and clamp, porcelain socket and weather-proof cord-grip fitting. The floodlight is 12 $\frac{1}{2}$ inches high overall,



The new Permaflexor floodlight.

and weighs 6 $\frac{1}{2}$ pounds. It has an adjustable bracket, permitting a 250-degree

vertical and a 360-degree horizontal swing.

Further information on this new floodlight may be secured by interested contractors and state and county highway engineers direct from the manufacturer by mentioning this item.

New Department Head For Rubber Company

C. W. Higbee has been made Manager of the newly organized Wire and Cable Department of United States Rubber Co. A native of New Jersey, Mr. Higbee attended Rennselaer Polytechnic Institute, where he graduated in civil engineering. He has been with the United States Rubber Co. since 1919, starting in the company's Wire Sales Department at Bristol, R.I., and subsequently became Manager of Wire Sales.

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Roadside Development In Post-War Planning

(Continued from page 2)

harmonious roadsides for our post-war highways, we must plan and design our highways with even greater care than in the past. Those highways which were designed with the aid and counsel of landscape engineers have shown, in this war period of inadequate maintenance, a better safety record, less erosion, and greater service to civilian traffic and military convoys through wider shoulders made possible by adequate right-of-way. Turn-outs and small roadside parks with sanitary facilities, built to serve the tourist in the past, have proved invaluable as rest areas for the tired truck driver carrying war materials from producer to assembly plant. In the post-war era, with the tourist again piling up mileage in his vacation travel, these parks and turn-outs will be a service to the visitor, local or long distance, as never before.

Landscape Engineer in Planning

Post-war designs, blueprints and specifications are being developed now by highway departments as rapidly as depleted personnel and reduced finances permit. Few highway engineers fully comprehend the design requirements which should determine right-of-way widths, and right here is where the landscape engineer starts his contribution to our highways. If the landscape engineer sits in on every step beginning with location and follows through during design and construction, he can prevent costly errors which would otherwise be discovered only after the highway has been placed in service. And in addition to the economy features of reduced future maintenance through careful design, the landscape engineer can add that touch of distinction to the highway through enhancing its scenic qualities.

The increasing trend to integrate roadside activities with regular highway design and construction is most promising. Post-war highway programs being prepared now will include many fundamental roadside features involving erosion control and drainage. Some states, already conscious of the value of adequately developed roadsides, are making plans to increase materially standard right-of-way widths proportionately. This will also include freeways in strategic locations.

Adequate right-of-way width will provide for: adequate traffic service, that is, the pavements and shoulders; adequate gutter width to provide proper drainage; adequately flattened slopes to furnish complete protection for erosion; and special traffic service areas for drivers to stop and rest, particularly in suburban and mountainous country. In many cases, increased right-of-way widths not only provide roadside areas adequate for more extensive roadside improvements, but in a larger measure will provide much better drainage, a vital factor in the protection of the major highway investment.

But drainage plans must not be confined to right-of-way limitations, even to those of maximum proportions. They should be extended from source to outlet—from the top of the hill to the brook or river. Drainage sections and the right-of-way should be designed to insure free flow of surface water without scouring. Antiquated ditches, which eventually assume the appearance of chasms along the edge of the pavement or narrow shoulder, must be replaced by wide safe parking shoulders and adequate stable gutters, either paved or sodded. The old eroding backslopes must be supplemented by flat vegetated slopes. These are fundamental landscape features.

When construction starts, the landscape engineer should be on his toes to see that proper topsoil is salvaged for the slopes, that desirable shade and ornamental trees are protected or transplanted, and that seeding, sodding, mulching, and other ground-cover features are installed at the proper season and in the proper manner.

Aid from Research

The landscape engineer should take advantage of the many research studies which have been made during the past decade on the subject of seeding, sodding, composition of grass mixtures and fertilizers, and adopt the best of these in his specifications for future construction. There are many subjects on which study and research have only been started, and many of these have revealed only general answers. In such cases, local experiments, tests, and research should be carried on by the individual highway departments.

Value of Waysides

The term "landscape" might be considered a misnomer as far as general roadside activities to date are concerned, as landscaping involves the completed picture—shade trees, grass, ground covers, and flowering shrubs, all combined in a natural manner. Added to these should be the casual parking places, waysides, developed vista sites, drinking water oases, and other factors which contribute to the comfort and safety of the traveling public.

Serious consideration should be given to the selection of adequate parking places for what will, no doubt, be constantly increasing tourist travel after the war. There are so many opportunities for developing turnouts or parking areas at strategic vista sites, and countless chances to preserve or protect strips of virgin timber or hillsides covered with native vegetation. There are other areas where historic events have taken place and which should be properly marked with historical data. Furthermore, major waysides, especially those bordering streams or lakes, offer unsurpassed recreational advantages to the average tourist. A word of caution, however, is appropriate. Consideration should be given only to areas which can be maintained at a moderate cost commensurate with their use. Their development should not be of the city park character, but more in keeping with the surrounding territory in which they are located—definitely

rural, natural, and picturesque. All of these areas should be a part of the regular highway program.

Roadside Maintenance

Landscape features are not produced in a month or year. It takes many years before the ultimate picture is developed.

Therefore, the landscape engineer must follow through with the maintenance department to see that proper mulching, fertilizing and reseeding of all vegetated areas on the roadside is done at the proper time and that the original plans are being developed to promote the most

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FORM-TY ENGINEERING FACTS

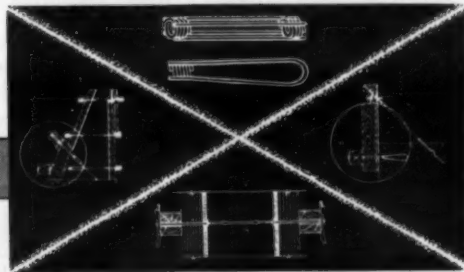
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Contractors on the job ... like those on other important war projects ... depend on GOODALL to supply only the best trouble-free rubber goods. Less repair on equipment means more work on the highway. Wise contractors know the GOODALL trademark means "Good Luck on the Job".

73 Years of "Know How"—Our Most Valuable Commodity

GOODALL
RUBBER COMPANY

WE ARE
PARTICIPANTS IN THE
OWNERSHIP AND OPERATION
OF
NATIONAL SYNTHETIC RUBBER
CORPORATION



Main Office: 2 South 30th St., Phila., Pa. Branches: New York, Boston, Pittsburgh, Chicago, Gov't Dept.: Washington, D.C. West Coast: Goodall Rubber Co. of California—Los Angeles, Seattle, San Francisco, Salt Lake City. Factory: Trenton, N.J.—Est. 1870.



Control of Roadsides For Better Appearance

(Continued from preceding page)

economical and pleasing results.

Zoning and Billboards

The zoning of our roadsides to prevent the encroachment of roadside stands, night clubs and filling stations which create traffic hazards, should not be neglected in post-war highway plans. This hazard is reduced somewhat by the purchase of wider rights-of-way because thereby the encroachment is automatically pushed farther back from the traveled way.

Wider roadside areas will allow for more intensive, more permanent and more natural planting effects. Shade trees and larger flowering shrubs will screen eyesores now so prevalent along the more heavily traveled highways. Provision can be made for utility lines and their proper screening by placing them along the edge of the right-of-way or preferably underground. Right-of-way widths adequate for these ancillary features will undoubtedly be one of the major contributions or heritages of highway departments in the coming post-war period—an added inducement for the city dweller to move to one of the great countrysides endowed by nature.

Another hazard is the attention-arresting billboard which hides the scenery beyond and destroys the beauty of the foreground. There is now ample legal backing for the control of the billboard. Virginia has removed over 150,000 illegal signs since the Outdoor Advertising Act became effective in 1939. The doubling of existing right-of-way widths, together with legalized billboard control, furnishes the Old Dominion State added opportunity for a more intensive and far-reaching roadside development program.

Of importance in billboard control is the unanimous decision of the Vermont Supreme Court on January 5, 1943, reaffirmed by a unanimous denial of the motion for reargument on February 24, 1943. The court not only declares the Vermont Billboard Law constitutional, but demonstrates that every state which follows its opinion can restrict, or even prohibit, highway billboards without infringing on any constitutional right of the billboard industry or of landowners.

"There is no inherent right to use the highways for commercial purposes" the court declares, and points out that the billboard is essentially a use not of private property but of the public thoroughfare—a point which had already been made by the Supreme Court of the Philippines and of Massachusetts. The situation is similar to the use of the highway by bus and trolley lines, for which uses permission may be granted or withheld by the state.

The Vermont Court goes still further, and takes an entirely new step, for it also declares that the private property owner has no inherent right to use or to lease his highway property for commercial advertising unless such advertising applies solely to business on the property. That the property owner has certain inherent rights in the adjoining street or highway, such as ingress, egress, light and air, has long been recognized by the courts. These rights are known as easements, and are governed by the Law of Easements. The right to be seen from the highway, the factor which gives the billboard its value, is likewise an easement over the highway, but may be used only for the benefit of the business located on the property.

Conclusion

Our horizons are being continually broadened. So our roadsides must be all inclusive with appropriate rural planning and zoning to protect them. We now have the opportunity to study and prepare post-war programs and designs which will be contributory to a permanent peace and a pleasanter world in which to live. Let us give the roadsides and countrysides their full measure of consideration.

New Compressor Bulletin

"A lot of compressor in a very small package" is the theme of a new bulletin on the Schramm Model 20 compressor for many uses such as pavement breaking, backfill tamping, demolition work, paint spraying and similar air jobs. The Model 20 is available with shop-truck mounting with handles for use in garages and highway shops, on a two-wheel trailer, or skid mounted for use in a truck.

Copies of this new bulletin describing and illustrating features of the Model 20 may be secured direct from Schramm, Inc., West Chester, Penna. Just mention this item.

Large Lumber Requirements Anticipated for This Year

The total lumber requirements for construction and all other uses will total approximately 31,500,000,000 board feet in 1943, it was announced recently by the War Production Board. This lumber consumption estimate, which includes the lumber which may be required by this country for use outside of the United States, was prepared by the WPB and the Department of Agriculture Forest Service.

The present forecast provides for prospective construction under severe limitations and does not take into account any unusual catastrophe or replenishing depleted stocks. Since lumber stocks are at the lowest point in several years, it is not at all certain that production will be high enough to enable consumers of lumber for war purposes to get what they need during the year. While active steps are being taken to increase production so that the major war consumers can be assured of their

requirements, consumption of lumber must be limited to actual production.

It is estimated that lumber requirements for new construction in the United States in 1943 will total approximately 11,000,000,000 board feet.

New Parts from Old

Four different methods for renewing worn metal parts, such as pump shafts and rods, are described in a new booklet recently issued by the International Nickel Co., Inc., 67 Wall St., New York City. Using a worn pump shaft as a practical example, the booklet explains and illustrates the step-by-step procedures for reconditioning the shaft by machining and refinishing the worn section; by building up and refinishing the section by welding; by metal spraying; or by heavy and hard coatings of electrodeposited nickel.

Copies of this booklet may be secured by those interested direct from the International Nickel Co. by referring to this item.



A PAGE AUTOMATIC DRAGLINE BUCKET WILL BOOST PRODUCTION ON YOUR JOB TOO!

On YOUR Coal Stripping, Air Base, Cantonment, Levee Building or General Construction job—PAGE AUTOMATIC DRAGLINE BUCKETS will BOOST PRODUCTION . . . make the most of Manpower and Machine!



A Page AUTOMATIC Dragline Bucket DIGS RIGHT IN. It is so shaped and designed that it AUTOMATICALLY lands in digging position with ALL its weight on the teeth. This means FASTER DIGGING AT ANY DEPTH . . . More dirt moved per shift.

Dragline operators on urgent "Victory" projects all over the nation depend on Page AUTOMATIC Dragline Buckets to get their jobs done F-A-S-T-E-R. They know that a PAGE Bucket will outdig any other bucket of equal size and weight.

PAGE ENGINEERING COMPANY
Chicago, Illinois

PAGE
Automatic
DRAGLINE BUCKETS

BOOST PRODUCTION . KEEP AMERICA STRONG



NOVO GENERATOR SET

On planes, tanks and ships it's "Fire-Power"—For fast construction it's "Light-Power" that brings your vital jobs through ahead of schedule.
The NOVO Generator Sets or "Light Plants" are powered with heavy duty industrial type engines—simple and fool-proof in construction—no extra gadgets, non-automatic, economical in original cost and operation.
Unfailing light for night work and power for small electric tools.

Send for complete information and FREE INSTALLATION DATA.

NOVO ENGINE COMPANY

280 Porter St., Lansing, Michigan
We would like to have complete information on the NOVO Generator Sets or Light Plants—also FREE Installation and Performance Data.

NAME _____
ADDRESS _____
CITY _____ STATE _____





C. & E. M. Photo
Making a 60-foot fill over a 90-inch
Armco Multi-Plate culvert 192½ feet
long on a vital relocation of U.S. 85 and
87 west of Colorado Springs.

Equipment Pooling Speeds Grading Job

(Continued from page 9)

carefully, using center braces throughout the erection. These were left in place until the backfill had been completed well above the top of the culvert. A 420-cfs Gardner-Denver portable compressor driven by the motor of an RD8 tractor mounted in the same chassis as the compressor provided air for six pneumatic tampers used around the culvert. Another of these same 420-foot compressors was used on this job for running three jackhammers in rock. The fill over the 90-inch Multi-Plate culvert contained a total of 78,000 cubic yards of rock and earth.

Finishing the Job

Throughout the job the maximum cuts ran 40 feet in earth and rock as through cuts and a 50-foot side-hill cut in rock. The highest fill was 60 feet over the 90-inch culvert. There were plenty of small cuts and fills for the entire length of the job as it was through very rolling country in the foothills of the Rockies.

Some dynamite was used for breaking down the rock in the cuts but a Wooldridge ripper was put in for most of the heavy work in the shales that predominated as they could be lifted by the heavy teeth and broken in that manner so that the scrapers could load the

material easily. A 40 per cent dynamite was used in such blasting as was done in the total 100,000 cubic yards of rock in the unclassified excavation on the job. In rock the slopes were left as steep as the rock would stand without danger of slides or falling rock during rainy or thawing weather. These slopes ran ½ to 1 and also ¾ to 1. In the rock fills the slopes were 1½ to 1 with the maximum layers of shale permitted in a fill being 4 inches. Earth was placed in layers 8 inches thick. To insure the maximum compaction of the fills the tamping rollers were pulled over the material as deposited and it was watered by three tank trucks which had to haul water an average of 2½ miles. There were two 1,000-gallon and one 1,500-gallon tank trucks.

Earth in fills was placed with slopes of 6 to 1, 4 to 1 and 2 to 1, according to the height of the fill, and the backslopes were uniformly 2 to 1 in earth.

Personnel

This 7-mile grading contract was awarded to DeRemer & Atchison of Denver, Colo., and was pushed through to completion under the personal direction of R. R. Atchison acting as Superintendent. For the Colorado State Highway Department, the work was under the direction of Chas. D. Vail, State Highway Engineer, with Glen McEldowney as Resident Engineer.

Post-War Highways Studied by A.R.B.A.

A detailed analysis of the post-war highway program has been published by the American Road Builders' Association in the form of study notes for consideration of the A.R.B.A. Committee on the Post-War Highway Program. The study outlines the cause and effect of previous periods of depression and contains specific recommendations for averting such an economic slump following the conclusion of World War II. While the publication deals primarily with the post-war highway problem, it nevertheless includes interesting discussions of many variable factors in our national economy.

Emphasizing the necessity of full employment to maintain periods of prosperity, the study is based upon an historical analysis of conditions in the national economy primarily affecting the prosperity of the nation. It shows that

an annual expenditure of \$100,000,000 on highway projects will provide approximately 100,000 man-years employment and involves the handling and processing of materials and equipment amounting to \$315,000,000. In addition, many new industries arise from and are dependent upon highway construction and motor transport. Thus, the study concludes, the expenditure of highway funds, because of their multiplying effect, has an unparalleled position in stimulating and stabilizing the national economy.

Declaring that the full economic benefits of highway construction can be obtained only through the utmost utilization of the contract system, the A.R.B.A. study presents conclusive evidence in

support of private enterprise. In this connection, it is also emphasized that highway construction is one form of public expenditure which stimulates rather than competes with private enterprise.

Envisioning an annual highway and airport program during the post-war era of upwards of \$3,000,000,000, the report concludes that such a program, in addition to providing employment, would go a long way in helping to maintain a high national income which will be essential to the post-war economy.

Maintenance preserves but does not increase the capital investment in a highway. Construction betterments are additions to the capital investment.

Safe . . . Quick-Acting . . . Interchangeable!

Quick
Acting



Universal
Type

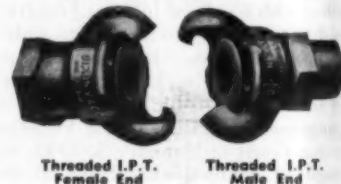
"AIR KING" Hose Coupling

Here's quick-acting hose coupling with a reputation for safety and efficiency on all types of pneumatic tools. A "twist of the wrist" as ends are pressed together makes a connection that actually becomes tighter under pressure . . . no danger of accidental opening of the line under a "full head."

Locking heads are identical for all sizes of hose and threaded pipe ends, permitting coupling of any two sizes of hose, or hose to pipe, within the "Air King" size range, without adapters, bushings or extra fittings.

A special auxiliary locking device, for services of hazardous nature or those involving extreme vibration, makes it impossible for coupling to come apart until manually released.

HOSE ENDS: ⅜", ½", ¾", 1" and 1½"
PIPE ENDS: ¼", ⅜", ½", ¾" and 1"



Sold by Manufacturers and Jobbers of Mechanical Rubber Goods

DIXON
VALVE & COUPLING CO.

Main Office and Factory
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BRANCHES:
CHICAGO • BIRMINGHAM • LOS ANGELES • HOUSTON

There's a Sterling
for every type of
material transport.

MEMO
from Superintendent's Office
Bill—
Use our Sterling
Wheelbarrows on that
new Government job.
Sterlings are tough
babies and I know
they can take the
punishment Jack

Leaders in
the Industry
Since 1904.

STERLING WHEELBARROW CO., MILWAUKEE, WIS.

Sterling
WHEELBARROWS

Look for this Mark of
STERLING Quality

A 4048-1/2

Travelers Prefer this
"CENTER OF ACTIVITY"
LOCATION IN
MILWAUKEE

Milwaukee's BEST BUY in hotel
accommodations. Right in the
heart of the city, close to every-
thing! 450 fine rooms with su-
perior comfort. Friendly hospi-
tality that travelers like. Coffee
Shop and Cocktail Lounge.
Garage and convenient
Parking Lot. Excellence
without extravagance.

Stylish for Comfort

HOTEL Wisconsin
OWNED &
OPERATED
BY MILWAUKEE HOTEL WISCONSIN COMPANY

WITH BATH FROM \$275
WITHOUT BATH FROM \$165
LEWIS S. THOMAS,
Mgr.



C. & E. M. Photo A convenient lean-to shed for the storage of lubricants.

Grease Storage Shed Has "Bear-Trap" Door

At the end of the contractor's storehouse at Chickahominy River Dam near Williamsburg, Va., is a lean-to that for convenience takes the ribbon. It is used to store drums of lubricant at an elevation just right for drawing off the oil, is locked easily at night, and the door provides protection to the laborer or truck driver getting oil in wet weather.

The full drums of oil are rolled up a pair of timbers onto the bench of 2 x 6 lumber and are held in place by cleats. The roof is covered with tar paper and the door is hinged at the top in three places, so that it is swung up to form an awning. The door is held up by one or two props consisting of notched lumber as shown in the photograph, hence the name "bear-trap." The door is locked by hasps and padlocks at both ends, providing adequate security against theft of the oil.

Boney Construction Co., of Norfolk, Va., is the contractor for the Chickahominy River Dam, with W. T. Watts as Superintendent.

Pavement Failures Studied in Illinois

During 1941, pavement failure became so serious on some of the heavily traveled routes in Illinois that it required the combined efforts of extraordinary maintenance gangs, the day labor organization, and contractors' forces to keep these highways open to traffic, according to a report in a recent issue of *Highway Research Abstracts*. Special cost studies were made of this condition, correlating the pavement surface maintenance costs with the type and volume of traffic. The results of these studies warrant the conclusion that while a small amount of heavy commercial traffic seems to have no immediate adverse effect on pavement surfaces, structural failure accompanies comparatively large volumes of vehicles imposing maximum, but not necessarily illegal, axle loadings on the highways.

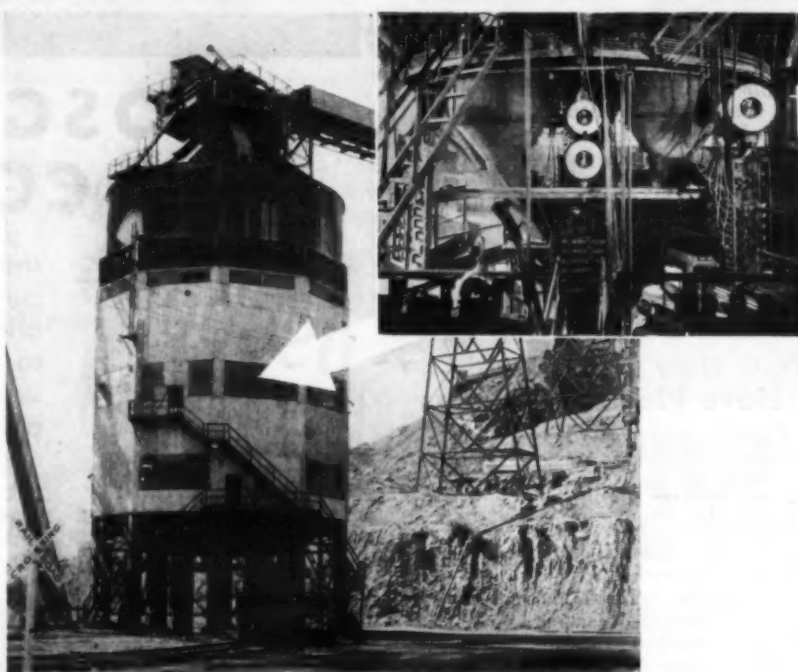
An example of this condition is Route U. S. 66 in Macoupin and Montgomery Counties from south of Mt. Olive to the Sangamon County line. The

pavement on this stretch of highway is of the same cross section and of approximately the same age, while traffic volumes, and particularly commercial traffic volumes, show considerable vari-

ation. The greatest traffic volume occurs south of the junction with State Route 16 at Litchfield. As a result of an interchange at Route 16, traffic volumes are somewhat reduced on the portion of the road between Litchfield and the junction of State Route 48. The exchange of traffic at this intersection reduces the total volume north of that point to about 50 per cent of that using the section of highway just south of Litchfield, while the total commercial and heavy commercial volumes are reduced by 60 per cent and 68 per cent respectively.

Accompanying this decrease in traffic volume is a far greater decrease in the cost of surface maintenance shown by the fact that the expense on the section carrying the least commercial traffic was 98 per cent less than that for the section carrying the heaviest commercial traffic during 1941.

What have you done for freedom today?
We can't all fight, but we can and must buy War Bonds!



Photos by The C. S. Johnson Co.

SPECIFY KRON SPRINGLESS DIAL SCALES

on your

BATCHER PLANTS

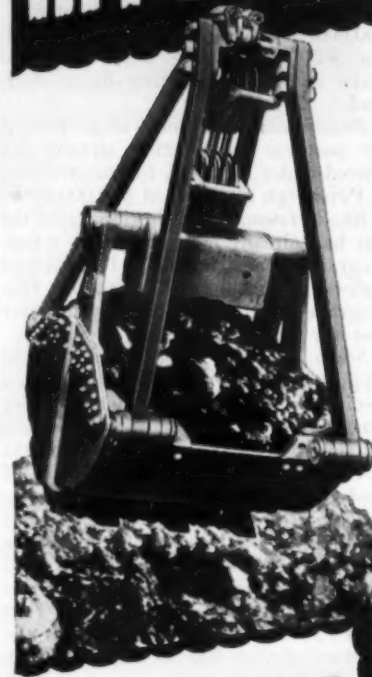
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ACCURACY—SPEED—DEPENDABILITY

THE KRON CO.

Bridgeport, Conn.

HAISS HI-POWER



FOR BIGGER PAYLOAD DIGGING

Engineered all the way through to do the job. Backed by fifty years of specialized manufacturing skill and experience. The pay-off bucket for better, more efficient 1943 work.

Hais Hi-Power has the brute strength for heavy digging, and the power in its bite to yank loose an embedded boulder. Weight and closing power combine to dig deep and tear out a heaping bowlful at every grab. Alloy steel parts for abrasion resistance, long bearings for longer wear.

★ Bucket agencies throughout the country. Write, wire for prices, delivery and catalogs.

GEORGE HAISS MANUFACTURING CO., Inc.

Canal Place & East 142nd St., New York

CONTRACTORS AND ENGINEERS MONTHLY

470 Fourth Avenue, New York

Enclosed is my remittance of \$2 for the next twelve issues of *CONTRACTORS AND ENGINEERS MONTHLY*.

Name.....

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N. B., A two dollar bill, check or postage stamps will be entirely acceptable.



Tanks produce results only in actual combat on the firing line.

To conserve their fighting capacity they ride to battle on Rogers Trailers, or if damaged are transported to the rear for repairs on a retriever type of trailer especially equipped to load disabled tanks.

Meanwhile, thousands of standard Rogers Trailers are serving efficiently on our factory fronts or in transporting defense equipment to various fortifications.



ROGERS BROTHERS
CORP.
ALBION, PENNA.

ROGERS
LOW BED—
HEAVY DUTY
TRAILERS

State Highway Plans Now Being Prepared

(Continued from page 15)

of concrete paving and 2,500 miles of bituminous paving, grading, drainage, grade separations and bridges.

Oregon is preparing a three-year post-war program amounting to about \$50,000,000. Already eleven projects totaling \$4,525,000 have been approved under the DHA, including one at Portland.

Pennsylvania has one large project for post-war construction already approved under the DHA for construction at Pittsburgh at a cost of \$10,000,000.

Rhode Island at the beginning of the war had already embarked on a 6-year program of construction on 190 miles of highway to cost about \$25,000,000. This program is being held in abeyance for post-war construction.

South Carolina reports that it could support a \$40,000,000 construction and special maintenance program to cover 2 or 3 years of post-war work, including surfacing of 4,600 miles of highways and the modernizing of 3,000 miles of hard-surface roads.

South Dakota's DHA program has not been released as yet, but the State Highway Commission has its eye on the future. Its advertisement in a current magazine features "Treasures That Keep" at Mount Rushmore, urges the purchase of more War Bonds which may be used for post-war vacationing, and ends with the suggestion of "South Dakota for Post-Adventure". This is an interesting and worth-while aspect of post-war planning. When the people of this country are once more freed from gasoline and tire rationing, bans on pleasure driving, and the burdens of war, there will be a tremendous urge to get out on the road again. There will be great competition among states for this tourist business and the gasoline-tax revenues resulting therefrom. This is a point which should not be overlooked in post-war planning.

Texas is working to have plans and specifications ready for a post-war program of \$200,000,000 to cover five years of highway construction, all the way from multiple-lane highways near the large cities to secondary service roads in sparsely-populated areas.

Utah has twenty-four DHA-approved projects, to cost \$3,250,000, which will total 109.6 miles.

Vermont is continuing its planning to improve heavy-traffic highways for post-war construction and has one DHA project approved, to cost \$2,475,000. Realizing the need for new rights-of-way for post-war highway construction, the Vermont State Highway Board is continuing the purchase of new right-of-way at locations where post-war transportation problems will inevitably require better alignment and wider highways. Thus, part of the funds which cannot be spent for highway construction now are being safely invested in the preparation for a backlog of construction in the post-war period.

Virginia has submitted a program, under the DHA, which is now under review by the Public Roads Administration.

Washington has placed a \$125,000,000 post-war highway construction program before the State Legislature, listing 75 projects with recommendations that the State Highway Department complete all engineering and legal preparations during the war. Highway officials report that nearly \$130,000,000 will be required to modernize the primary and secondary highway system because of deferred normal construction and maintenance. Already fourteen projects have been approved under the DHA for construction in or near Mount Vernon, Olympia and Seattle, to cost \$5,625,000.

West Virginia, which already has twenty-three projects approved under the DHA to cost \$4,878,000, plans an expenditure of about \$8,000,000 in an immediate post-war construction program. About \$1,000,000 of this sum will be for bridges.

Wisconsin is confining its post-war planning to projects which can be financed by funds which are now accumulating in its treasury. The present program calls for the expenditure of about \$22,000,000 for post-war construction.

More Money for Planning?

Except for comparatively small funds available in state highway department coffers, the major finances today for the cost of designs, plans and specifications for post-war highway construction are the woefully inadequate \$10,000,000 provided by the Defense Highway Act of 1941. The American Association of State Highway Officials has set about to secure the release of the \$174,000,000 of existing Federal-Aid balances now credited to state highway departments for use in preparing construction plans and securing right-of-way for post-war highway construction.

Coincident with this, the Federal-Aid law should be amended so that unexpended Federal funds allocated to state highway departments for projects which cannot be undertaken during the war will not automatically revert to the Treasury for re-allocation on June 30. Also, the term "construction costs" in the Federal-Aid law should be redefined to include the purchase of rights-of-way.

Four New Hand Drills Have Plastic Housings

Using a new plastic material called Drillite, the Black & Decker Co., Towson, Md., has developed new housings for its 1/4-inch and 3/8-inch Standard electric drills. This Drillite plastic is made with a shredded cotton-duck base, which is reported to give it a high impact resistance, and enables it to withstand considerable wear and abuse. The plastic is also heat resistant and an insulator against dielectric shock. The housings are smooth and easy to handle, and the black finish maintains the appearance of the tool for a long period.

To provide long service life, steel inserts have been cast into the plastic housings to carry all ball bearings, and

threaded steel inserts in the field housing for housing assembly screws. Steel air vents in the commutator end housing insure ample motor ventilation. Another feature of this new housing is the reduction in weight of the complete unit as compared with former models using metal housings. Both units are offered

with either end handle or side handle control, equipped with the well-known pistol grip and trigger switch, and with universal motors operating on either alternating or direct current.

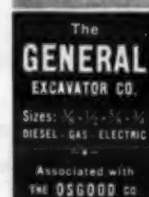
Further details on these new electric drills may be secured by those interested direct from the manufacturer.



OSGOOD AIR CONTROL



the smooth, velvety, effortless control force that brings the operating ease and efficiency of steam to this OSGOOD Type 80 Dragline. OSGOOD Air Control is simple in operation, easy to maintain, and costs next to nothing. Even though our production schedule is full—now is a good time to check on OSGOOD Air Control.



PUT IT WHERE YOU WANT IT!

The biggest problem in Concrete Placing is to "put it where you want it". GAR-BRO Equipment has solved this problem for you.

Regardless of whether it is a simple maintenance problem or the largest dam, there is a standard product for the job. The GAR-BRO attachments for standard equipment permit placing of concrete into the most inaccessible places.

Catalog No. 55 illustrates and describes GAR-BRO Concrete Buckets and their attachment.



Hung from the bucket, the big steel sub-hopper transfers discharge of bucket into the GAR-BRO seamless drop chute without waste.



CONCRETE PLACING EQUIPMENT

Concrete
Buckets
Batchers
Hoppers
Skips
Chutes
Carts
Wheelbarrows

INDUSTRIAL EQUIPMENT

Foundry Carts
Acetylene Carts
Material Carts
Wheelbarrows

MFG. BY GARLINGHOUSE BROTHERS
2416 EAST 16TH STREET • • • LOS ANGELES

The Seabees

(Continued from page 45)

trained by using the men who are in training and the N. C. T. C. equipment to do all of the work required by the Public Works Division of the camp.

The Welding School

The Welding and Blacksmith School in T14 makes experts of welders who have had a small amount of experience as well as from those who have never had experience in this field but show aptitude. The 30-day welding course gives as thorough a training as can be found anywhere. Each session is 1/2-day long and includes classroom and shop work. On the first day the men are told why they are in a Specialist Class and the purpose of the special training, with its advantages and opportunities. They are instructed in the rules and regulations of the school, which forbid the reading of papers or magazines during school hours, and that loafing is forbidden. They are impressed with the fact that the tool room and the welding booths must be clean and in order at the end of each day. All men with previous welding experience are then given the standard welding test.

The succeeding days in the welding school are devoted to the showing of motion pictures and slides illustrating types of welds and the handling of tools, demonstrations and individual work on position welding for all kinds of metals, brazing and the welding of special applications such as pipes, pipe hangers, vessels, hard-facing on wearing parts of construction equipment, etc. As with the other schools, the men are taught not only to work in the shop but they go out into the field to make necessary repairs. In this school, iron is forged for the many needs of construction equipment.

The school is equipped with 12 tables for gas welding and 12 booths for electric welding. The gas-welding tables are built up with welded pipe frames and fire-brick tops and a revolving flux holder which pulls out from beneath the table to prevent spilling. Cinder-block curtain walls with metal shelves between form the compartments for the electric welders. A tube for welding rods is fixed beneath the shelf and a swinging bracket with a clamp on it is mounted on the curtain wall to hold material for

position welding.

The welding equipment includes seven Hobart and four Lincoln arc welders as well as one Westinghouse portable welder driven by a Hercules motor and six P & H-Hansen portable welders. Since welding rods will be less easily supplied on some island in the Pacific than in a welding shop in the States, the men are taught economy in all of their work. Signs reading "Burn 'Em Short, Rods Are Scarce" are found throughout the school.

The shop is very proud of a plate straightener which will handle up to 5/8-inch plate 24 inches wide. It was built in the shop, is motor-driven, and has a reverse switch so that material can be run through the rolls repeatedly without rehandling.

Conclusion

The Construction Battalions, U.S.N., are under the command of the Bureau of Yards and Docks, Rear Admiral Ben Moreell, (CEC) U.S.N., Chief, with Commander J. R. Perry (CEC) U.S.N., Director, and Commander E. J. Spaulding, (CEC) U.S.N.R., Navy Department, Washington, D.C., Officer in Charge of Seabee Recruiting. Captain Fred F. Rogers, U.S.N., (Ret.), is Commanding Officer, U. S. Naval Construction Training Center, Camp Endicott, Davisville, R.I., and Commander C. C. Seabury, (CEC) U.S.N., Executive Officer, with Lieut. J. H. Lofland, Jr., (CEC) U.S.N., in charge of Military Training and Lieut. W. R. Lockhart E-V (S) U.S.N.R., in charge of Technical Training.

Wheel Bearings May Be Cause of Tire Failure

Chipped and worn wheel bearings have been isolated by Goodyear Tire & Rubber Co. engineers as the cause for the premature failure of many truck and trailer tires, it was announced recently. Worn bearings, it was said, are mainly responsible for "flat spots" on tires which have plagued operators of trailers for many years. Goodyear based this discovery on the close inspection and studies of the tires used on more than 100 truck and trailer fleets.

Each of the fleets was discovered to be using tires with "flat spots" which had been generated by bearing trouble. In one fleet of 487 trailers, the Goodyear engineers found two barrels of bad bearings in 90 days. They were charged with wearing out a total of 146 tires before the tires had yielded their maxi-

mum potential service. Loose rollers, chipped or worn rollers, chipped or worn outer race or chipped or worn inner race are among the bearing troubles which cause these "flat spots".

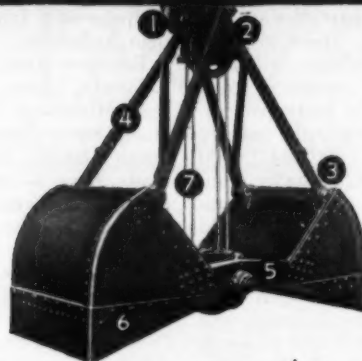
Goodyear started its study of "flat spots" after it was found that less than 50 tires wear out among every 100 applied by truck-trailer operators. The balance must be discarded before their

normal life expectancy because of blow-outs, cuts, repair failures, or mechanical defects which cause breakdowns.

Goodyear engineers cautioned truck and trailer operators to take preventive measures wherever possible to avoid abnormal wear on bearings which may result from overloading or from improperly mated or incorrectly inflated dual tires.

SEVEN FACTS

IT WILL PAY YOU TO KNOW ABOUT BROWNHOIST BUCKETS



- 1 5 to 22% larger sheaves lengthen rope life.
- 2 Underslung top block lowers center of gravity.
- 3 Extra large cover-bearing-easily lubricated.
- 4 Well-braced, forged Ball Bars give extra strength.
- 5 Annealed cast steel closing arms increase digging efficiency.

- 6 Heavy carbon-steel sharpened digging lips (with or without teeth) provide efficient digging.
- 7 Cables last longer by being kept from contact with material.

Write today for complete catalog of Brownhoist rope reeve, power wheel, special purpose, open type grab, link-type buckets.

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DAY CITY, MICH. • DISTRICT OFFICES: NEW YORK, PHILADELPHIA, PITTSBURGH, CLEVELAND, CHICAGO

BITUVIA Road Tar



Speeds Maintenance and Repair Work

☆ Road maintenance and repair take on new importance in war time. Main highways and principal feeder roads must be kept in condition for the safe, speedy movement of food, munitions and other essential supplies. BITUVIA offers distinct advantages for the maintenance and repair of all types of roads. It is quickly applied, penetrates deeply, binds the aggregate firmly. The resilient, skid-resistant BITUVIA surface contributes to safe driving and longer tire life. Standard grades to meet all Federal, State, County and Municipal specifications.

PLASTUVIA CRACK FILLER: A waterproof filler which binds firmly to brick and concrete, filling and sealing cracks and openings to prevent water damage. Will not flow in summer nor crack in winter.



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War Regulations Leave the Quality Unchanged

RAZOR-BACK Shovels Still Give You 60% MORE BACKBONE

Extra thickness in the center, from tip to top, plus tapered sides, provides the strength and stiffness of a 13 gauge shovel with only 15 gauge over-all weight.

PREFERRED BY PRIORITY BUYERS for Perfect Balance, Deep Hang, Long Life, Easy Handle Replacement.

THE UNION FORK & HOE COMPANY

566 Hocking Street
Columbus, Ohio

Stone, Ballast and Industrial Forks, Asphalt and Road Rakes—Distributors Everywhere.



SEND FOR FREE COPIES:

"How to Get More Work Out of a Shovel"—trains green hands, increases output without extra effort. Suitable for posting up on the job. Write us.

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Highway Industry Will Serve Post-War Needs

(Continued from page 51)

construction of town roads.

Great sums will be needed to finance express highways into and through our cities. Since property taxes on which cities rely for their funds will not suffice, since motor-vehicle and gas-tax refunds to cities from state taxes are inadequate, and in the past Federal-Aid for city expenditure has been very small, some method must be found to finance this exceedingly important part of the post-war highway program. There are 412 cities over 25,000 population, most of which have efficiently organized street departments which could participate directly in Federal-Aid, while the balance of 1,640 cities between 5,000 and 25,000 population, and the 1,422 smaller communities between 2,500 and 5,000 population, could have their Federal-Aid monies administered through the state highway departments.

In this manner we should open up a vast new field of highway, road and street construction, distributed throughout the entire nation, capable of absorbing the latent man-power available following the war and resulting in the prompt rehabilitation of our highway system made necessary by the deferred maintenance during the war years and creating new traffic facilities to meet the demands of new and less expensive automobiles built for greater speed and safety.

Federal-Aid has been so successful in creating our inter-connecting Federal and state highway system that its continuance must be assured to the states, and resolutions of both the American Association of State Highway Officials and the Highway Officials of the North Atlantic States urge such action. We believe it should be extended to counties and cities.

Some state highway officials are urging a change in the existing method of Federal-Aid allocation. Highway planning surveys and other available data show that the existing method of allocation does not meet present-day highway needs and traffic conditions, and also show that Federal-Aid can be more fairly and equitably distributed in the public interest. It is suggested that the present

formula, which is based roughly one-third on area, one-third on population, and one-third on road mileage, should be changed to include a fourth factor, gasoline consumption, which is the real measure of traffic demand for highway improvement.

No More Diversion

Gasoline consumption means gas taxes which, with other motor-vehicle revenues, provide states' highway funds. If we are to insure an adequate post-war highway program, we must demonstrate to the public the unfairness and unsound economics of diverting highway revenues to non-highway purposes. Since 1933, states have diverted \$1,750,450,000 of highway-user funds to purposes other than highways.

Fourteen states, including California, Colorado, Idaho, Iowa, Kansas, Michigan, Minnesota, Missouri, Nevada, New Hampshire, North Dakota, Oregon, South Dakota and West Virginia, already have constitutional amendments prohibiting diversion. Plans for submitting similar amendments to the voters are underway in Alabama, Arizona, Arkansas, Connecticut, Delaware, Indiana, Maine, Maryland, Massachusetts, Montana, Nebraska, New York, Oklahoma, Pennsylvania, Rhode Island, Texas (exempting 1 cent of the state gasoline tax now going to schools), Utah, Wisconsin and Wyoming.

This leaves fifteen states in which their highway funds may be raided by the politicians for non-highway purposes. It is reported that highway users are urging the reduction of current diversion of highway funds in a number of states, and it is to be hoped that positive measures will be taken in all states to insure that highway funds are used for the purpose for which they are collected—for the construction and maintenance of the highways. This is a very vital part of post-war planning.

Conclusion

The great highway profession and industry, made up of highway department engineers and officials, contractors, and manufacturers and distributors of road construction and maintenance equipment, has before it the opportunity to use its organizations, its administrative ability, its engineering skill, and that precious commodity *time* to draft the blueprints and lay the foundations for a vast much-needed highway program which will contribute not only to the

solution of some of our post-war economic problems but to further development and improvement of the industrial, agricultural and recreational facilities of this country. Will the industry be ready? We believe it will.

Equipment Rental Rates Increased on Alaska Jobs

An increase of 25 per cent in the maximum monthly rental rates for construction and road maintenance equipment on Alaskan projects was authorized on March 25 by the Office of Price Administration. This action is expected to assure the leasing this spring to Alaskan war projects of a considerable quantity of construction and road equipment which until now has been used in connection with mining operations, according to information received by OPA.

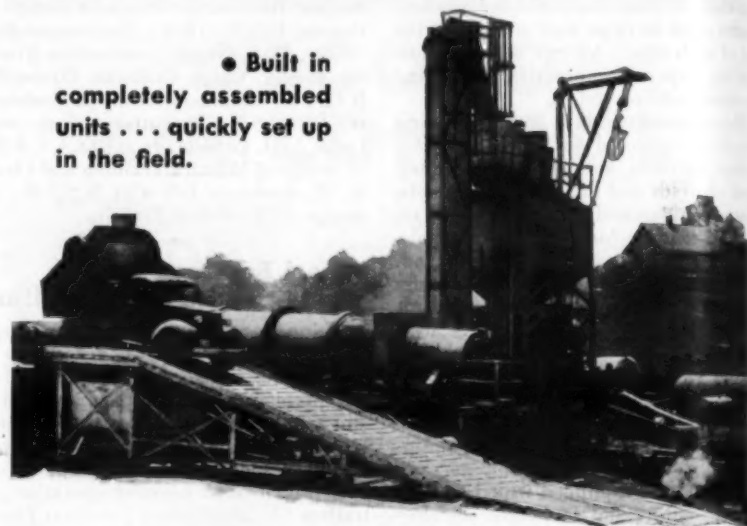
A study of overhaul and repair costs made by OPA shows that the present ceiling rentals established by Maximum Price Regulation No. 134 (Construction and Road Maintenance Equipment Rental Prices or Service Charges) are sufficiently high to provide a margin

over costs in the rentals of domestic equipment but are not adequate to cover the unusual costs incurred by Alaskan owners of equipment, OPA says. The survey showed that severe conditions of weather and terrain and the primitive housing and upkeep conditions prevailing while equipment is on the job expose Alaskan equipment to greater wear and tear than is true for equipment used for similar work in the United States.

This action was taken after the U. S. Army Engineers, familiar with Alaskan working conditions, concurred in the claim that the relief was required. The step does not change daily or weekly rental rates established by the regulation and applies only to the dollars-and-cents monthly rates. The amendment does not affect the rates provided for the equipment leased to the U. S. Army Engineers which were established previously at double the ceiling rate.

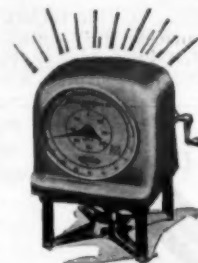
On May 21, 1881, the American Red Cross, known throughout the world for its alleviation of human suffering, was founded. Commemorate the day by contributing to your Red Cross Chapter.

• Built in completely assembled units . . . quickly set up in the field.



Portable Asphalt Plant

Assembled in Hours



THE "Brass Brain" (FLUIDOMETER)

This automatic metering system saves time, materials—insures uniformity. For all types of plants.

By "portable" we mean that this Model PA asphalt mixing plant is not only easily disassembled and moved from one job to another by truck or rail, but it can be quickly set up because units are entirely self-contained and require no field assembly. This means a big saving in assembly time—hours instead of days. The portable features of this plant are obtained without sacrificing either plant capacity, operating efficiency or durability. . . . Hetherington & Berner, America's oldest builder of asphalt mixing plants, offers the newest developments in both stationary and portable plant design. Write for Bulletin CE-260.

HETHERINGTON & BERNER Inc.
INDIANAPOLIS • INDIANA

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Salesman Wanted

Man now calling on tractor owners and dealers, road contractors, municipalities, county and state highway Depts. To add side line of essential tractor repair parts. Splendid field for immediate profitable volume. Give full details of lines sold and territory covered.

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NBC Building Cleveland, Ohio

Hoist For Sale

USED NOVO WHG DRAGLINE HOIST

50 Hp. Buda Engine; 3/4-Yd. Bucket
Rebuilt—Excellent operating condition

Lakeshore Machinery & Supply Co.
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Phone 2-5655

WILLIAMS "SUPER-HI" TENSILE TIE RODS

INEXPENSIVE U. S. STANDARD THREAD RODS

For heavy construction, use Williams "Super-Hi" Tensile Tie Rods. No job too large; none too small—to warrant Williams economy and speed. There will be a tremendous amount of dam construction after the War.

Start laying your plans now. Write for complete details on the Williams Tie Rods.

3/4" diam. U. S. — 16 thd.			1/2" diam. U. S. — 13 thd.		
9,500 lbs. Ultimate Tensile 7,500 lbs. Working Load per Rod			16,500 lbs. Ultimate Tensile 13,000 lbs. Working Load per Rod		
LENGTH of Rod	Price per 100 rods	App. Wall Width	LENGTH of Rod	Price per 100 rods	App. Wall Width
12" or less	\$3.00	15" or less	12" or less	\$4.00	15" or less
Over 12" add 1/4c per inch			Over 12" add 1/3c per inch		

WILLIAMS "VIBRA-LOCK" CLAMPS



Vibra-Lock Clamp Removal Is Here Illustrated

Use Williams Vibra-Lock Clamps for dams, bridges, heavy construction, battered walls, etc. Adjustable and flexible for all purposes, these clamps will hold the forms rigidly and produce accurate results.

Use Williams Simplex Clamps for best results in concrete construction for sewage disposal plants, filtration plants and buildings.

Send us your plans and we will figure the ties, showing locations, etc.

WILLIAMS FORM ENGINEERING CORP.
Box 925, Madison Square Station, Grand Rapids, Michigan



Placing portable steel runway. The holes in the planks decrease weight, permit drainage and camouflage.

Pierced-Plank Type Airplane Landing Mat

One of the interesting products developed in the present war is the pierced-plank type of airplane landing mat, now being used in the construction of emergency and semi-permanent landing fields and runways on many fighting fronts. This is one of the war developments which may have new applications in the days of peace to come. Such portable mats may be used not only in the aviation field to provide emergency landing areas or parking areas for planes, but also to provide temporary parking areas for cars and, in the construction field, to stabilize sandy or muddy areas to provide hauling roads to the sites of construction projects.

In their war service, these mats are used on various kinds of terrain, where bulldozers level off the area staked out by the Army engineers. Dirt-moving scrapers cut down the humps and fill in the hollows. Then trained crews follow and, as the landing mats are delivered, the runways are laid in sections. The mats are fastened together with clips, as shown in the illustration, making a solid continuous sheet of metal strong enough to support the heaviest bombers. Camouflage of these landing areas is easy, and if necessary the mats can be taken up and moved to a new location.

This is one of the products which the Hercules Steel Products Co., Galion, Ohio, is making as its contribution to the war effort. Production of Hercules dump and cargo bodies of all sizes has at the same time been greatly increased and thousands of such bodies, mounted on various types of chassis, have been delivered to Government agencies for war work, both in this country and abroad.

Truck Design Saves Critical Materials

Appreciating the necessity for conserving vital materials, engineers and production experts of General Motors Truck & Coach Division are constantly cooperating with the Army Ordnance Department in seeking out new methods which make it possible to build military trucks in large volume, decrease costs to the taxpayer, and at the same time help conserve critical materials so vital to the war effort.

By drastic redesign and material substitutions since early in 1941, GMC engineers have been able to remove 99 per cent of the aluminum formerly used in its vehicles, and, except where rubber is vital to the safe and practical operation of the vehicle, all rubber has been removed. The use of copper, tin and nickel has also been tremendously reduced by the substitution of non-critical materials, all without any concession to the quality or performance of GMC trucks for the Armed Forces. This material-substitution program has made avail-

able for other essential military purposes approximately 12,130,000 pounds of aluminum, 2,160,000 pounds of rubber, 4,160,000 pounds of copper, 330,000 pounds of tin, and 1,140,000 pounds of nickel.

One example of the saving of critical materials was the development of the one-piece rear bumper, now standard on Army trucks and other vehicles. Previously the truck bumper was of the built-up type, and the new design saves the taxpayer nearly \$5.00 per truck as well as having released over 17,000,000 pounds of vital material for other war uses. Additional savings in steel and dollars are resulting from the fact that this bumper design has been made available to all companies with Government contracts for trucks, jeeps and various other types of military vehicles.

A typical example of a skillfully worked-out change-over, as a result of the materials urgency, is the conversion from steel to wood bodies on Army trucks. Acting under directives and specifications laid down by the Army, GMC collaborated on the design of the three sizes of wood bodies to replace the steel ones previously used on cargo-type vehicles. These wood bodies are now standard, and the saving in steel per truck is approximately 1,000 pounds. This means that every thousand trucks with wood bodies release 1,000,000 pounds of steel for ships, tanks, and other essential war weapons.

New Link-Belt Catalog On L-B Standard Models

The man who orders repair parts, or wishes to buy just the parts for a new installation, will be interested in the new 180-page streamlined, condensed, General Catalog No. 850 of standard equipment, announced by Link-Belt Co., 307 North Michigan Ave., Chicago, Ill. Representative types and sizes of power-transmission and materials-handling equipment are included, preference being given throughout to the more widely adaptable designs.

By standardizing on a few types and sizes and selecting standard equipment, instead of a needless variety, the purchaser will benefit not only by obtaining better delivery, but also through a reduction in number of spare parts to be carried on hand as insurance against delays in production. A wide variety of data, including prices, are given on chains, sprockets, silent and roller chain drives, bearings, pulleys, gears, buckets, conveyor idlers, car spotters, speed reducers, etc.

A copy of Book No. 850 will be forwarded by Link-Belt to anyone requesting it on his business letterhead and mentioning CONTRACTORS AND ENGINEERS MONTHLY.

Maintenance Manual On Electric Hand Tools

A new 20-page pocket-size booklet, containing complete but brief instructions on the proper care and operation of all types of portable electric hand tools has been published by the Independent Pneumatic Tool Co., 600 W.

Jackson Blvd., Chicago, Ill. Special attention is given to the more common and simple problems in connection with the maintenance of the motor, cable, switch and brushes. Right and wrong operating methods are discussed and

shown in pictures.

This booklet, No. JE-199, will be sent to readers of CONTRACTORS AND ENGINEERS MONTHLY on direct request to Independent if they will mention this item.

AMERICAN WHEELBARROWS

With Steel Wheel

for WAR ORDERS

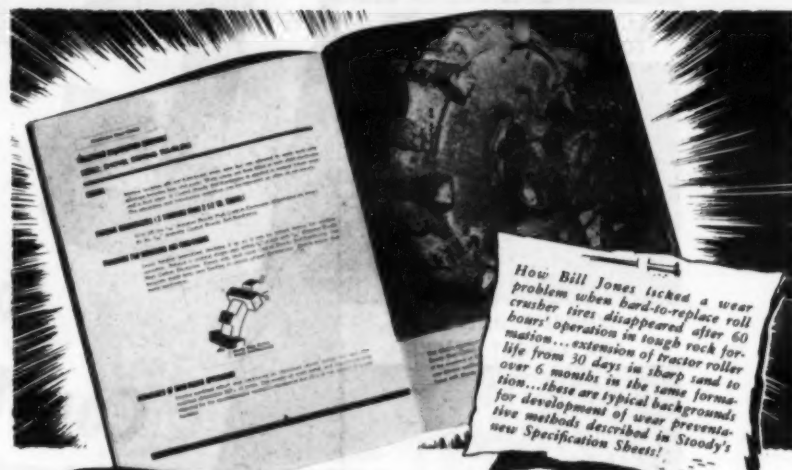
Barrow shown is the American No. 1—4 cu. ft. struck capacity DeLuxe Concrete Wheelbarrow available with steel wheel.

Code with steel wheel..... PERFECT-S



Write for Bulletin

THE AMERICAN STEEL SCRAPER CO., SIDNEY, OHIO



Free access to a pool of experience

Summary of Contractor's Methods for Maintaining Construction Equipment Despite Wartime Shortages

HERE are twenty proved hard-facing applications that halt abrasion on fast wearing, earth-working and crawler type equipment. Each is the result of practical experience combined with intensive engineering research.

Stoody Specification Sheets tell where and when to apply the hard metal—the quantity of material required to successfully protect the part. They describe hard-facing procedures concisely, the advantages and approximate gain in service life, and they include large photo reproductions of properly hard-faced parts.

Take advantage of this pool of information for keeping your equipment in operation under pressure of contract deadlines and wartime shortages.

To conserve paper we have printed a limited quantity of these Specification Sheets. For this reason, copies are restricted to those concerns engaged on essential projects where wear is a major problem. If you feel that you qualify, write for your copy now!

In active territories engineering service is available for contractors having special wear problems. If you need help, address your request to The Engineering Department, Stoody Company, Whittier, California.

STOODY COMPANY
1131 WEST SLAUSON AVENUE, WHITTIER, CALIFORNIA

STOODY HARD-FACING ALLOYS

Stop wear... Eliminate Repair

RUD-O-MATIC TAGLINE



A FOOL-PROOF TAGLINE

The Rud-o-Matic Tagline is operated on a spring principle and maintains at all times a positive tension sufficient to steady a clam shell bucket under any and all conditions, and will operate perfectly with the boom at any angle. It eliminates all the grief usually encountered with the average tagline as there are no weights, tracks, pins, carriages, or sheaves to wear out or to get out of order. Because of the large bearing and fewer sheaves, the saving on cable alone would eventually pay for it.

Tagline is complete with fair lead and cable attached and can be installed in less than one-half hour. Most of the crane manufacturers have adopted the Rud-o-Matic as standard equipment.

Manufactured by
McCaffrey-Ruddock Tagline Corp.
2121 E. 25th St., Los Angeles

New Highway Engineer Appointed by PCA

Warner Harwood has been appointed Regional Highway Engineer of the Portland Cement Association for the territory comprising the states of Wisconsin, Minnesota, North Dakota, Iowa, Nebraska, Missouri, Kansas, Arkansas and Oklahoma.

Mr. Harwood has specialized in highway and municipal work, both as a practicing engineer and in public work with the Cook County Highway Department in Illinois. After joining the staff of the Highways and Municipal Bureau

of the Portland Cement Association, 33 W. Grand Ave., Chicago, Ill., he was assigned to special design and technical problems.

War Service Booklet

Almost hourly service distance is the theme of a new 8-page pertinent booklet issued by R. G. LeTourneau, Inc., Peoria, Ill. Full of valuable service facts, this pamphlet deals specifically with the exceptionally fast service being offered by LeTourneau-Caterpillar representatives as a matter of wartime necessity.

"One-stop" LeTourneau service, the factory's part in helping your dealer to assist you, photos of LeTourneau tools of peace now knee-deep in war, news of the various Tournawelds, and notes about five other company books to help you improve operating ideas, make your construction tires last longer, properly lubricate your LeTourneau equipment, and otherwise get the best equipment performance possible, are found in this newest LeTourneau booklet.

Copies of this booklet, Form No. A-35, may be secured direct from the R. G. LeTourneau, Inc., by mentioning this item.

Pneumatic Tool Company Holds Officer Election

At a recent meeting of the Board of Directors of the Independent Pneumatic Tool Co., Chicago, Ill., Neil C. Hurley, Jr., who has been associated with the company for eleven years and for the past four years has served as Vice President and Director, was elected Executive Vice President.

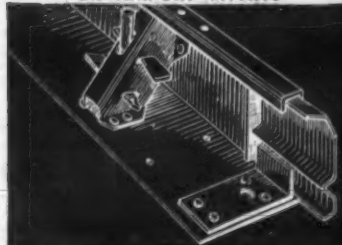
John A. McGuire was elected Secretary and E. R. Wyler was named Vice President with headquarters in New York City. All other directors and officers were re-elected.



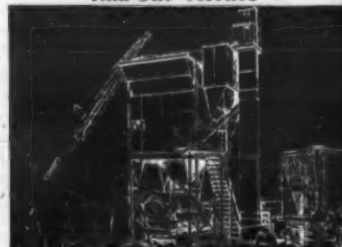
FINISHING MACHINES FOR
CONCRETE AIRPORT PAVING



CONCRETE SPREADERS
FOR AIRPORT PAVING



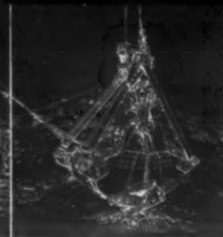
ROAD FORMS FOR
AIRPORT PAVING



TRUCK MIXER
LOADING PLANTS



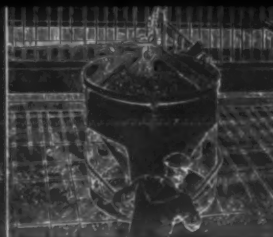
AGGREGATE
BATCHING PLANTS



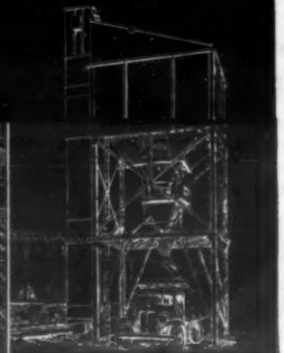
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BUCKETS



TAMPING
ROLLERS



CONCRETE BUCKETS



BULK
CEMENT PLANTS

GHQ

for dependable
Construction Equipment

America's construction forces need reliable and familiar equipment to do the big hurry-up job of building air bases, roads, depots, docks, etc., for the Army and Navy—so, as a matter of course, they took Blaw-Knox Construction Equipment along to the wars.

Our construction battalions throughout the world are guided by men who know from experience the dependability of Blaw-Knox equipment.

Every effort is being made by Blaw-Knox to supply the military requirements for construction machinery—to help build for victory.

BLAW-KNOX

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★ ★ ★ ★ FOR VICTORY BUY U. S. WAR BONDS AND STAMPS ★ ★ ★ ★

Problems of Building Airline Across Africa

(Continued from page 42)

and place them carefully on their heads, like over-size head pans. This native labor was supplemented with tractors shipped from the United States and equipped with bulldozer, roter and plow attachments. These tractors at times did double duty in furnishing motive power to operate the steel derricks used in erecting hangar steel.

Hangars of the most modern type were erected at the main bases along the line with steel shipped from U. S. ports, and were interiorly fitted with fluorescent lights, utility outlets and necessary hoists, while on either side of the hangars maintenance workshops were set up with all necessary electrical and hand equipment. Where such extensive facilities were not required, as at the intermediate stops, prefabricated metal shops were erected. Several power houses were built at the main base sufficient to meet all needs, and at one base in the western part of Africa 12,000 feet of underground electric cable was laid in order that the base could be completely equipped with refrigerators, ice-cube machine, electric stoves and mixer, electric laundry equipment, telephones, power, light, and fire alarms.

International Harvester power units were used for a varied list of purposes, supplying power for lighting equipment, refrigerating units, and for power tools, among other services.

Moving Materials In

Approximately 5,000 bundles of structural steel were part of the huge and varied cargoes of goods shipped in a continuous stream across the Atlantic to West African ports, then sent by rail or road to construction centers up to 1,000 miles inland. Transporting this steel, together with other supplies, presented special problems peculiar to the task of building the trans-Africa airline. Railways which had to be used had seldom if ever been designed to haul heavy and cumbersome loads, such as structural steel. Railroads had low clearances and sharp curves, as did the motor roads, and it was found necessary to equip freight cars with special bolsters to handle the additional loads imposed.

Among the 10,000 separate items which had to be contracted for and shipped from this country for use in building and maintaining the series of air fields were: 1,000 cases of electrical equipment, 100 large fuel tanks, tractors, trucks, reels of cable, and drums of paint. Actually, the job amounted to transporting to Africa a complete transcontinental airway; it proved to be the largest transportation assignment ever successfully undertaken by any airline.

The Weather

Local weather conditions proved to be an unknown construction factor, yet at one base construction was carried on throughout the rainy season, with only four days lost during the entire three months. During that period the rain came down almost incessantly and totaled 200 inches.

Heat proved more of an annoyance than a hindrance. Temperatures at some desert stops topped 160 degrees in the sun, but one base had living quarters completely air-conditioned.

A Good Job Done

The thoroughness with which the construction was done was proved in part by the unusually good safety and operations record established. President Roosevelt's announcement that Pan American Airways had been assigned the task of setting up the airline was made on

August 18, 1941. Before the end of October, the first scheduled flight was completed and in October, 1942, the complete route was militarized.

A New Training Manual For Company Fire Brigades

The company fire brigade is a highly important part of any firm's safety organization. How to prevent fires, how to use fire extinguishers, hand hose, and other fire appliances, and exactly what to do when a fire occurs is knowledge which an organized fire brigade must have before a fire starts. Today, when fires can do so much damage to important war jobs or plants and therefore to the war effort, it is even more important than ever to be prepared to put a fire out immediately, should one start.

A new 184-page volume recently published by the National Fire Protection Association is designed to meet three needs: first, as a training manual for employees assigned to carry out fire-fighting duties; second, as a reference book in those plants where a fire brigade has already been organized; and third, for those plants or groups which need the essentials but not the details of a large fire-protection organization. The text was prepared by the N.F.P.A. Committee on Firemen's Training and is profusely illustrated with drawings and photographs.

Copies of this "Industrial Fire Brigades Training Manual" may be secured by those interested direct from the National Fire Protection Association, 60 Batterymarch St., Boston, Mass. Price: \$1.50 a copy.

For Fast Operation in Those "Tight Spots"

Simplex No. 304, 10-ton jack. Raises on both up and down stroke. 22 1/2" high; 13 1/2" lift, side toe 2 1/4" from ground level. Weight, 62 lbs. No. 304T is trip type. (Capacity 15 tons)



Toe lift at right angles to lever bar permits working close to walls, in narrow aisles, on bridges, cribbing, etc. There's a Simplex for every construction jacking problem that arises.

Templeton, Kenly & Company Chicago
Better, Safer Construction Jacks Since 1899

Make Your Jacks Last Longer!
Send for bulletin on the proper care of jacks.

Simplex
LEVER - SCREW - HYDRAULIC
Jacks

GALION MOTOR CRADERS



THE GALION IRON WORKS & MFG. CO.
Main Office and Works: GALION, OHIO

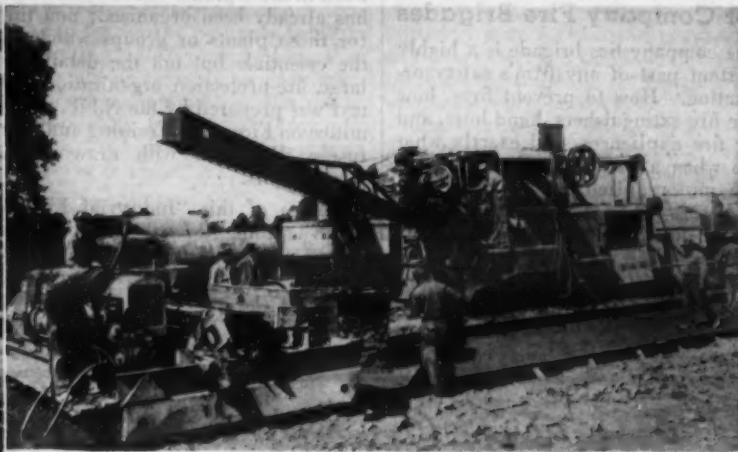


GALION ROAD ROLLERS

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C. & E. M. Photos
Paving operations on the 7.5-mile Dayton-Vandalia, Ohio, access-road project to a new air base. At left, the paver bucket delivers a batch of concrete to the grade; above, the Mansome 34-E paver which provided a batch of concrete every $\frac{3}{4}$ minute; and, at right, one of the expansion joints which consisted of $\frac{3}{4}$ -inch Carey Elastite pre-moulded joint material encased in two metal shields, and ten round dowels. See page 2.



C. & E. M. Photos
Top photo, the effective homespun Huntley rake which removes oversize gravel from the tar surface treatment on New Hampshire roads. Bottom photo, a pair of Burch Under-Truk hydraulically controlled hoppers used for the mixing operation. The unit at the left has lowered the hone, while the one in the foreground is getting into position. See page 23.



Pan American Airways Photo
Early stages of construction at a base on the airline across Africa. See page 41.



Above, the attractive field stone building on the outskirts of Columbus, Ohio, which houses the office and garage of the Franklin County Highway Department. See page 1.



At left, a typical creosoted-timber bridge, with a 30-foot roadway and eight 22½-foot spans, on a new relief highway around Coalinga Springs, Colorado. This new road provides a connection between various military bases in the state free from traffic congestion. See page 9.

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